From trade routes to trekking trails: A comparative assessment of livelihood capitals among Sherpa households in the Everest (Khumbu) region of Nepal

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Abstract

This paper presents comparative analysis of the livelihood capitals of Sherpa households in Nepal's Everest (Khumbu) region, with a focus on their livelihood adaptation, diversification strategies, and resilience over a period of about seventy years. This timeline is marked by significant changes following Nepal's democratic transition in 1951 and the first ascent of Mount Everest in 1953, which led to the rapid expansion of tourism—now a major contributor to the local as well as national economy. Using case studies of two Sherpa villages—Namche Bazar and Thulo Gumela—this research examines the differences in the state of livelihood capitals between households located along the main tourist trail to Everest Base camp and those in more remote areas. The research is based on household survey data gathered from sixty male and female Sherpa participants, with balanced representation across all age groups in both villages. Findings reveal that Sherpa households have developed diverse strategies to navigate shifting economic, political, and environmental contexts. An analysis of livelihood capitals based on a five capital model as defined in the DFID's Sustainable Livelihood Framework (SLF) shows that Namche households effectively leverage financial capital to enhance other forms of livelihood capital, while Thulo Gumela also demonstrates effective resource management despite having lower levels of human, financial, and physical capital. This study provides essential insights for relevant authorities and stakeholders seeking to improve sustainable livelihood outcomes for both on-route and off-route villages in Khumbu. It underscores the need for strategies that promote conservation within the Sagarmatha National Park and its buffer zone while fostering economic growth and community development.

Keywords: livelihood, Namche, Sherpa, Thulo Gumela, tourism

Introduction

The Sherpa, or *Adivasi Janajati*, is one of Nepal's fifty-nine indigenous communities, making up approximately 0.45% of the country's population of 29.16 million (Maharjan & Maharjan, 2017; Sherpa & Wengel, 2023). The Solukhumbu District, including the Khumbu region, is home to 17,878 Sherpas. Present day Sherpa of Khumbu are believed to be descendants of Tibetan migrants from the Kham region who began to settle in this area about five to six centuries ago (National Statistics Office [NSO], 2021). Sherpas' cultural and religious practices emphasize resource conservation and innovative land use shaped by local knowledge (Sherpa, 2016). Known for their resourcefulness in harsh climatic conditions, Khumbu Sherpas have historically relied on natural resources and transhumant pastoralism for their livelihoods, alongside subsistence farming (Ortner, 2001). In the early 1800s, bartering trade with Tibetans and Indians emerged as an additional income source (Bhattarai, 2021; Stevens,

1996). Later the first ascent of Mount Everest in 1953 marked the beginning of tourism as a new economic avenue for Khumbu residents (Nepal, 2015). Consequently, the Sherpa economy has evolved through three phases: reliance on natural resources and agropastoral activities; bartering trade; and tourism—though agropastoral activities have remained a secondary livelihood throughout these transitions. The livelihoods of the Sherpa community, along with their evolving challenges, have been profoundly influenced by political and institutional changes in Nepal over the centuries (Sherpa & Wengel, 2023). The advent of democracy in 1951 was a crucial turning point following the end of the 104-year Rana regime (Aryal, 2016; Pawson et al., 1984; Ripert et al., 2009). This new government adopted an open-door policy, permitting foreign visitors to enter Nepal officially for the first time, which led to the inaugural ascent of Mount Everest and sparked the tourism activities in the Khumbu region. However, it took several decades for Everest tourism to become integral to the local economy (Fisher, 1990; Nepal, 2015; Rai, 2017). The influx of visitors notably increased after the construction of the Lukla airstrip in 1964 (Fisher, 1990; Nyaupane & Chhetri, 2009), significantly reducing travel time from Kathmandu to Khumbu from two weeks to a mere 45-minute flight (Stevens, 1993). The establishment of Lukla Airport and Sagarmatha National Park (SNP) in 1976, recognized as a UNESCO World Heritage Site in 1979, were pivotal in enhancing visitor numbers (Fisher, 1990; Nepal, Mu, & Lai, 2020; Rai, 2017).

Tourism is now Khumbu's primary economic driver, with most households relying on it for income (Nepal, Mu, & Lai, 2020; Nyaupane, Lew, & Ttasugawa, 2014). What started as mountaineering, later evolved into trekking, is now popular as "Everest tourism" (Nepal, 2015). Several studies (Fisher, 1990; Miller, 2017; Nepal, Mu, & Lai, 2020; Rai, 2017; Sherpa, 2012) have shown that tourism revenue has greatly improved living standards for many Sherpa families. However, there is limited empirical data on which villages in the region experience the most significant positive or negative impacts of tourism. On the other hand, the studies by Stuart (2024), Singh et al. (2020), Jaquemet (2017), Spoon (2008), Nepal (2002), and Stevens (1996) demonstrate a decline in traditional agro-pastoral practices due to tourism, while climate change research (Faulon & Sacareau, 2020; Nepal, 2011, 2015; Sherpa, 2014) warns of growing social and economic disparities without sustainable livelihoods. that the rise of Everest tourism has led to a noticeable decrease in the Sherpa community's involvement in traditional agro-pastoral practices, signaling a major shift in their way of life. Other studies (Adams, 1992; Gioli et al., 2019; Lama, Becker, & Bergström, 2019; Pandey & Bardsley, 2015; Rayamajhi & Manandhar, 2020; Wyss et al., 2022) have examined Himalayan social-ecological systems, mountain livelihoods, and adaptation strategies to understand community resilience in the face of growing socioecological challenges. Most existing studies on Khumbu focus on major settlements along the main route of the region like Lukla, Namche, and Khumjung, overlooking remote villages. Particularly, a significant gap exists in understanding the impacts of Everest tourism on Sherpa communities in remote villages. Against this backdrop, this study aims to explore the impact of Everest tourism on Sherpa livelihood systems through a comparative study of the villages, located along the main route to Everest Base camp (Namche Bazar) and the one located off this primary route (Thulo Gumela). It examines economic, sociocultural, and environmental aspects of livelihoods to identify key drivers of transformation and the state of livelihood capitals (Knutsson & Ostwald, 2006; Levine, 2014). Understanding these drivers clarifies how they shape livelihood systems and support adaptation and resilience . Using DFID's Sustainable Livelihood Framework, the study applies a comprehensive approach to assess the five forms of livelihood capital among Khumbu Sherpa households.

This research focuses on a period of about 70 years, beginning with the advent of Nepal's first democracy in 1951 that opened the region to tourism. Notably, while the study villages share similar cultural and geographic contexts, their access to tourism and income opportunities differs based on proximity to the main trail and thus varying access to local tourism initiatives and income generating opportunities. The research also explores how tourist behavior and changing tourism trends impact livelihood capitals, offering policy insights to promote equitable growth and long-term sustainability for both on-route and off-route villages.

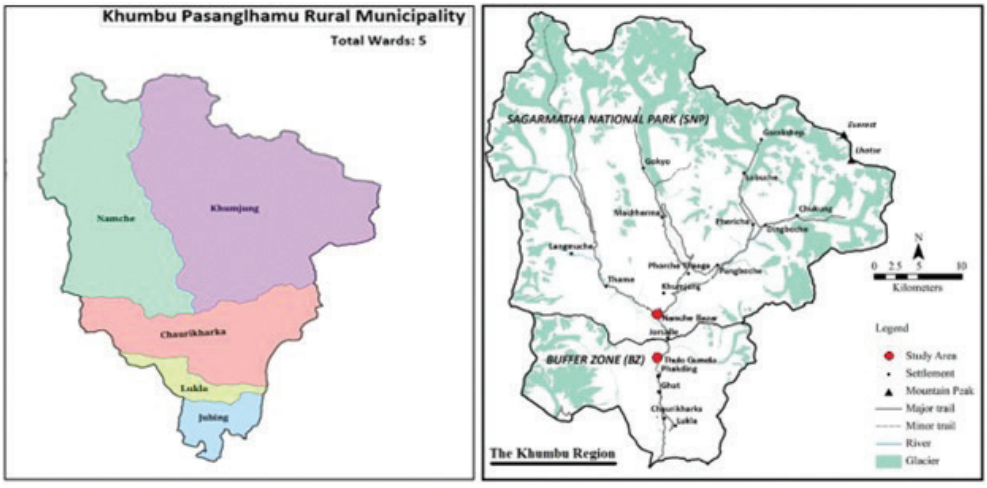
Material and methods

Study sites

The study villages are Namche Bazar and Thulo Gumela, situated in the Khumbu region of Solukhumbu district in Nepal. This area is geographically defined by the coordinates 86˚31' - 86˚58' East Longitude and 27˚47' - 28˚71' North Latitude.

Figure 1

Maps of study sites



Note:

Maps showing five wards of Khumbu Pasanglhamu Rural Municipality (L) and the study sites- Namche Bazar and Thulo Gumela (R)

Source: Bhattarai (2021)

Namche Bazar

Namche Bazar situated in Sagarmatha National Park at an altitude of 3,440 meters, is the gateway to Mount Everest and the cultural hub of the Sherpa community (Sinanan, 2022). This bowl-shaped village, home to approximately 200 households, lies just half a kilometer below the SNP headquarters (Bhattarai, 2021). It attracts numerous visitors during the autumn and spring tourist seasons, offering stunning views of peaks like Mount Everest and Mount Amadablam. Historically a trading center, Namche has evolved into a marketplace driven by tourism, shifting from traditional sales of Tibetan artifacts to retail goods such as imported

foods and trekking equipment. Unlike other Khumbu villages, it features modern amenities including electricity, piped water, telecommunications, health posts, banks, and schools. Visitors can explore Sherpa culture through significant sites like a monastery and stupa, along with two museums: one focusing on Sherpa culture and another detailing Khumbu's history.

Thulo Gumela

Thulo Gumela is a quaint village located in the Buffer Zone of Sagarmatha National Park at an elevation of approximately 2,700 meters, about 800 meters below Namche Bazar. Situated one kilometer away from TokTok near Phakding—an acclimatization stop for trekkers—Thulo Gumela consists of thirty Sherpa households and five non-Sherpa blacksmith families, totaling around 100 residents (Bhattarai, 2021). The village, surrounded by verdant hills and snow-capped mountains, features painted mani walls along its trails and is home to the Pema Choling Monastery, a cultural hub for local Sherpa communities. Agriculture is the primary source of livelihood for the residents of this village, although some engage in seasonal tourism activities and construction work. Access to public services is limited due to remoteness; children must walk to neighboring villages for school, and residents travel to Phakding or Tok-Tok to buy essential household goods. For larger purchases, they often go to Salleri, the capital of Solukhumbu or Kathmandu, where prices are comparatively lower.

Data collection and analysis

This research is based on a descriptive design and employs a mixed-methods approach, combining primary and secondary data. Primary data were collected through a household survey of sixty participants, ensuring gender balance from both study villages. Given the small population size in both villages as well as inconsistencies in their availability because they live in multiple residences, small sample numbers were considered adequate for the purpose of this study. Secondary data were obtained from relevant books, online journal articles, research papers and were useful in complementing the primary findings, providing context about the Khumbu, Sherpa population and research settings. The purpose of household survey was primarily to gather quantitative data through survey questionnaires from young (20- 30 years), adult (31- 45 years), and elderly (46 years and over) Sherpa members of each village to capture understanding of a range of perceptual and experiential differences among the people of these diverse age groups but about the same issues. The survey questions were broadly categorized into two sections: the first focused on socio-demographic and livelihood issues, while topics related to tourism, community development, environmental changes, and socio-ecological resilience were incorporated in the second section. Besides a few open-ended questions, the survey questions were mostly categorical, including dichotomous (yes/no/don’t know), multiple choice, check box as well as interval/ratio and Likert scales.

The survey data were transcribed into English and thematically coded using the Sustainable Livelihood Framework (SLF), which encompasses five livelihood capitals: human, social, natural, physical, and financial. Microsoft Excel was used to facilitate coding process and support systematic analysis of the data. Descriptive statistics were used to summarize the characteristics of households, while thematic analysis analyzed the impacts of tourism on adaptive capacities in each of the villages. Study participants were fully informed of the voluntary nature of the study and their right to withdraw at any time. Informed consent was obtained from all participants by signed or stamped thumbprint forms, a common legal practice in Nepal. Confidentiality and ethical use of the data were respected, and the collected

data was designated solely for the researcher's doctoral thesis and academic work. Fieldwork was conducted during the autumn season employing purposive sampling and snowball technique in close consultations with the key informants and SNP officials.

Results and discussion

Human capital

In the context of Khumbu Sherpa households, four indicators were examined to represent the status of human capital in both study villages including age, education, employment skills, and health condition.

Age

In this study, the working-age population is defined as individuals aged between 20 and 64 years. This classification indicates that a considerable majority of participants—86.66% from Namche and 90% from Thulo Gumela—are situated within this productive age range. Consequently, age emerges as a critical demographic factor that profoundly affects the nature and efficacy of household livelihood strategies and developmental pathways (Gebru & Beyene, 2012).

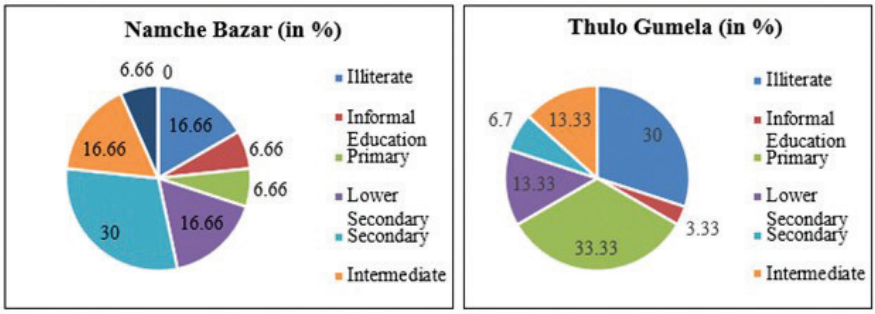
The results suggest that a significant segment of the population has the potential to generate livelihoods in both villages examined. Additionally, out-migration for educational or employment purposes may have led to a reduction in the number of active household members, which in turn impacts the households' overall ability to maintain their livelihoods.

Education

The education-related inquiries in this study were designed to assess the literacy status of respondents, categorizing them as either literate or illiterate. The source of education was also examined, distinguishing between formal education—obtained through educational institutions—and informal education, which is acquired from family members or community sources without attending school. The findings (Figure 2) indicate that a smaller proportion of participants in Namche (16.66%) were illiterate compared to those in Thulo Gumela (30%). Nonetheless, it is noteworthy that a significant majority of participants from both villages were literate. Among the literate respondents, three individuals—two from Namche and one from Thulo Gumela—reported receiving informal education. In terms of educational attainment, 30% of literate participants from Namche and 33.33% from Thulo Gumela completed high school (up to Grade 10) and primary education (up to Grade 5), with these individuals aged between 26 and 35 years. Additionally, similar proportions achieved secondary (up to Grade 8) and intermediate (two years post-Grade 10) levels of education, with figures at 16.66% for Namche and 13.33% for Thulo Gumela. Notably, only two participants from Namche possessed a bachelor's degree, while none held a Master's or Doctorate degree in either village. However, it is plausible that there are additional university or college graduates within these villages but were not captured in this survey, given the small sample size of this study.

Figure 2

Educational attainment of Sherpa households in Namche Bazar and Thulo Gumela



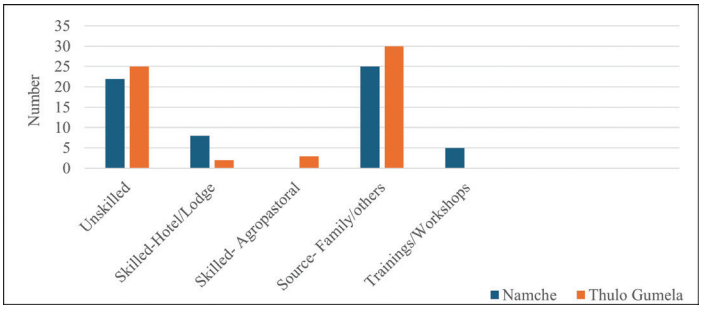
The results indicate that while the literacy rates are promising, there remains room for improvement in higher educational attainment within these communities. Future studies with larger sample sizes could provide more comprehensive insights into the educational landscape and inform strategies to enhance educational access and success for all residents.

Employment skills

The participants in this study were inquired about their employment skills. Those who affirmed having such skills were further questioned regarding the types and sources of these skills. Figure 3 explains a significant proportion of participants from Namche (73.33%) and Thulo Gumela (83.33%) expressed that they did not possess specialized employment skills. However, these individuals believed that the knowledge or skills they utilized for earning a livelihood were primarily acquired through family networks, particularly from elders, as part of the practice of following family occupations. Conversely, among the participants from Namche, 26.66% indicated that they had employment skills, specifically in the hotel and lodge sector. In Thulo Gumela, 16.66% of participants reported their skills in agropastoral activities (10%) and hotel/lodge businesses (6.66%). When discussing the sources of their skills, 75% of skilled participants from Namche and all skilled participants from Thulo Gumela acknowledged that they learned and developed their abilities first through family networks, followed by a practical approach known as 'learning by doing', which included knowledge gained from tourists, media outlets, newspapers, and the internet. Additionally, 25% of skilled participants from Namche credited their skill enhancement to training courses and workshops organized by various national and international organizations.

Figure 3

Participants' employment skills, types and sources



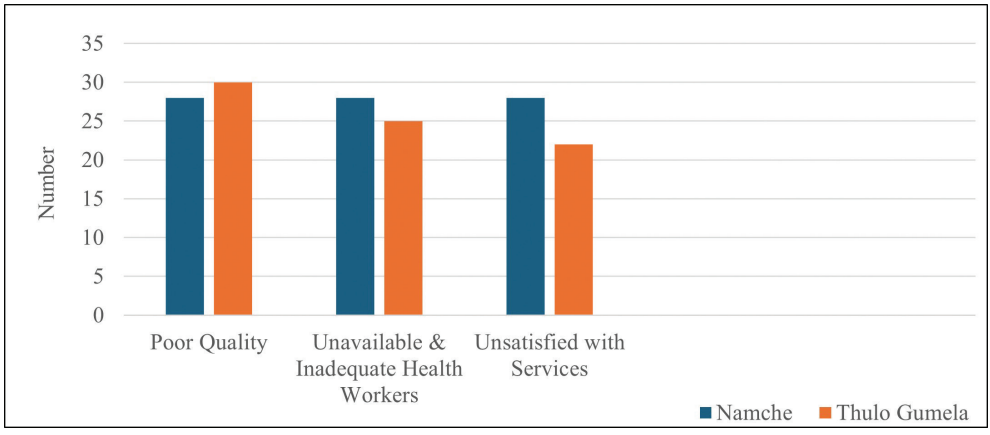
These results demonstrate that the local community based and development organizations including Namche Hotel Association, Namche Women's Group, and Namche Youth Group, Sagarmatha Pollution Control Committee (SPCC), World Wildlife Fund (WWF)-Nepal, EcoHimal-Nepal, the SNP through Buffer Zone programs, CORE International, and USAID have been instrumental in helping the Sherpa people to enhance their skills, awareness and capacity through trainings and workshops in Namche. For example, after attending training sponsored by a Canadian organization-CORE International in 2015, members of the Namche Women Group were successful in obtaining a grant to support their activities such as capacity and leadership building programmes from the local government body (CORE International, 2021). However, these initiatives lack in Thulo Guemla.

Health status

Participants from Namche reported easy access to health services, with the Namche Health Center located at a distance of about a ten-minute gentle walk from the village center. Conversely, those from Thulo Gumela faced significant barriers, having to travel to neighboring villages for healthcare facilities. The closest facility in Jamphute requires a twenty-minute gentle walk, while comprehensive health checkups necessitate a trek of 4 to 6 hours to reach Lukla or Khumjung. Notably, Figure 4 shows that only 6.66% of participants in Namche rated the health services at Namche Health Post as good; conversely, a staggering 93.33% deemed inadequate health services in their local health post at Jamphute based on their past experiences.

Figure 4

The state of health services in Namche and Thulo Gumela



Specific grievances included the inability of health assistants to diagnose conditions accurately or prescribe appropriate medications and a general shortage of healthcare personnel in the village. Furthermore, it was frequently reported that the Namche Health Post was often out of stock of government-supplied generic medicines. All participants from Thulo Gumela expressed concerns regarding the quality of health services available at the Jamphute health post. Specifically, 83.33% of those who sought health services reported frequent unavailability of health assistants and nurses. Furthermore, 88% of the individuals who utilized these services deemed them unsatisfactory, citing that health workers were unable to accurately diagnose their conditions or prescribe appropriate medications. Additionally, concerns were

raised regarding emerging pests and mosquitoes as potential health threats linked to climate change.

These findings call for urgent action from concerned authorities to invest in enhancing healthcare infrastructure and resources in these villages. By addressing these deficiencies, it is possible to improve health outcomes significantly and ensure that all individuals have access to quality care. Although major cities outside the Khumbu region offer quality hospitals, many households cannot afford treatment due to high costs. The findings also indicate a pressing need for improved medical facilities within closer proximity to these communities, particularly for vulnerable groups such as children under 15 and the elderly over 65.

Physical capital

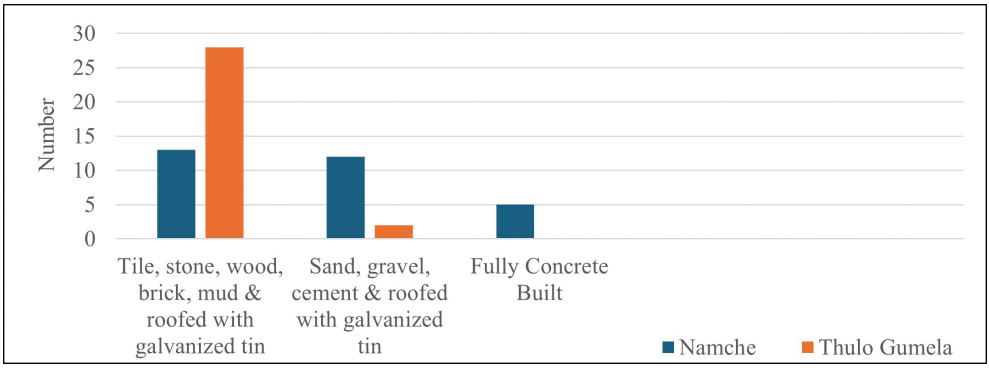
In examining the livelihood systems of Khumbu Sherpa households, several key indicators of physical capital have been identified: (1) housing conditions, (2) land holdings, (3) possessions and valuables, (4) access to technology and equipment, and (5) private services and infrastructures. All participants from both villages acknowledged tourism as the primary driver of their economic prosperity. This underscores the significance of tourism as a vital economic activity that underpins the physical aspects of livelihood capital for these households. To accurately assess the impact of tourism on household economies, it is essential to include all income generated from tourism-related activities in the evaluation. The findings indicate that the state of physical capital is notably stronger in Namche compared to Thulo Gumela. The following three subsections will provide a detailed overview of the status of physical livelihood capital among the households surveyed.

Housing conditions

The architectural design of the newly constructed Sherpa houses in the Khumbu region has undergone significant transformations over the years, particularly following the surge in Everest tourism that began in the 1970s (Nepal, 2002). Participants were surveyed regarding their housing types and construction materials. None resided in traditional thatched-roof homes constructed from wood or stone or mud. Figure 5 demonstrates that in Namche, 43.33% of participants lived in houses made from tile, stone, wood, brick, and/or mud with galvanized tin roofs, while a striking 93.33% of those in Thulo Gumela reported similar constructions. The remaining participants' homes—except for five in Namche—were modern structures built with sand, gravel, and cement and also roofed with galvanized tin. Among these five homes in Namche (16.66%), all were constructed entirely of concrete. This transition suggest that Sherpa households in Khumbu are moving towards using modern materials. Improvements in the built environment have come from two key conditions: reduced access to traditional materials, and increased availability and the desirability for modern resources when building homes. This is a tipping point for households, having greater levels of economic conditions, along with improvements in both economic and physical capital. Even if the use of concrete raises sustainability questions (Watson & King, 2018; Watts, 2019), these have been considered climate resilient and thus suitable for the people of high Himalayas such as Khumbu (Karki, Burton, & Mackey, 2020; Wood et al. 2020). Additionally, traditional materials, known for their climate and earthquake resilience, are becoming less accessible due to extraction restrictions governed by the local and SNP regulations (Adhikary & Johnson, 2025).

Figure 5

Type of house and house building materials in Namche and Thulo Gumela

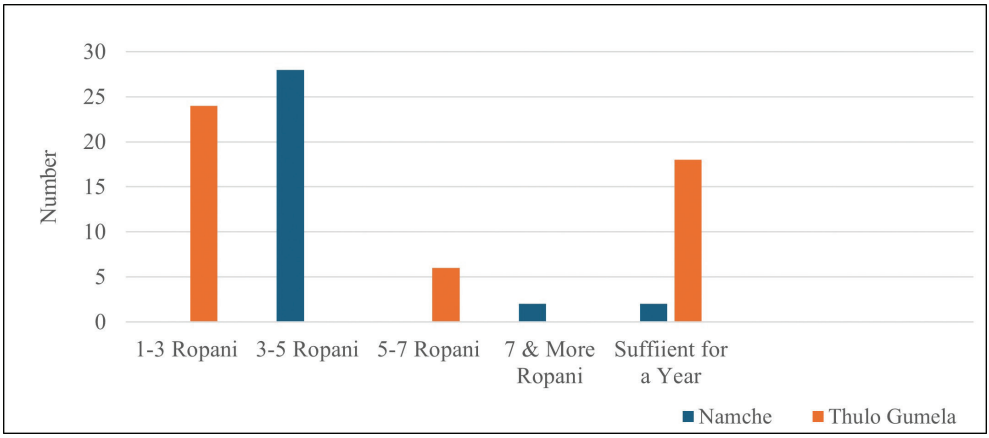


Land holding

Landholding is an essential aspect of a household's physical capital in the Sustainable Livelihood Framework, representing the total area of arable and residential land. For agropastoral households, it is crucial as their main livelihood source. In both villages, khet or kharka were not owned by any households, likely due to the rocky terrain and lack of irrigation. All participants owned at least one ropani of land, with Namche households generally holding more land than those in Thulo Gumela. While 93.33% of Namche households owned three to five ropanis, 80% of Thulo Gumela households owned one to three ropanis. Regarding food sufficiency, only 6.66% of Namche participants felt their vegetables were adequate for a year, compared to 60% in Thulo Gumela.

Figure 6

Landholding size of participants' households



The data shows that while most Namche residents own large plots of land, they do not use them efficiently for agriculture, resulting in inadequate yields to support their households. This inefficiency is partly due to a lack of maintained agricultural skills, leading to an overreliance on tourism as their primary livelihood, which is vulnerable to economic

fluctuations and external challenges like COVID-19 and climate change. Although greenhouses are commonly used for vegetable cultivation in Namche, they are unnecessary in Thulo Gumela due to its favorable climate. Additionally, residents in both villages must purchase essential household items like rice and oil from local shops or markets.

Possessions and valuables

Affluent households in Khumbu are characterized by possessions such as hotels or lodges with modern amenities, attached-bathrooms, solar heating systems, large televisions, and substantial cultivable land. They also have close ties with travel agencies and receive regular remittances from family members. Observation during my fieldwork and the collected data reveals that most surveyed households, except for 13.33% in Thulo Gumela, possessed modern appliances like gas stoves and electric heaters, indicating a standard of a 'modern' home. In Thulo Gumela, 43.33% of households lacked a gas cylinder and stove, unlike those in Namche. Nevertheless, all participants acknowledged these items as standard in Khumbu society, viewing them as essential assets that enhance a household's physical capital.

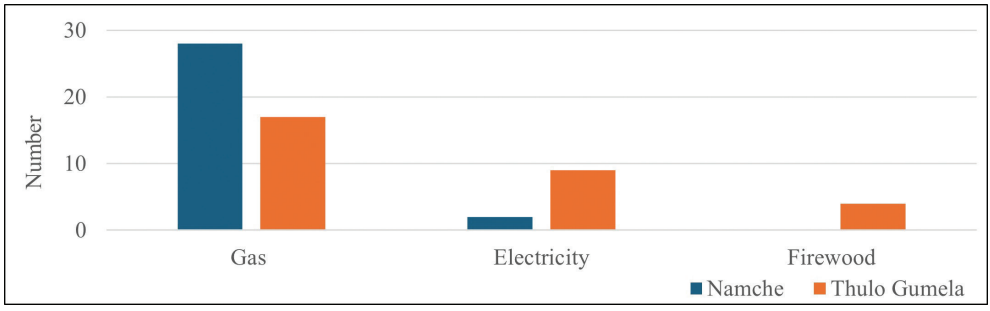
This shows absolute discrepancies in physical capital as a consequence of financial capital, driven by tourism access for the households of these villages. This highlights the need for inclusive development to bridge regional inequalities in livelihood opportunities and infrastructure among on route and off route villages in Khumbu.

Technology/equipment

Evidence from Khumbu illustrates a shift from traditional to modern livelihoods due to the impact of Everest tourism (Nepal, 2015). This modernization has led to significant changes in the lives of Sherpas, driven by their interactions with international tourists. Many Sherpas now utilize modern goods and technologies, such as down jackets and alternative energy sources like LPG, which have been financially supported by tourism income. Over time, advancements such as micro-hydropower, biogas, solar panels, and LPG gained popularity. In this study, 93.33% of Namche participants reported using LPG for cooking, with minimal reliance on electricity (6.66%) and firewood. Only one household in Namche was using solar power for lighting. In Thulo Gumela, 56.66% of households cited LPG as their main cooking energy source and one used solar power for anything.

Figure 7

Main source of energy for cooking



These findings suggest that solar energy has been underutilized in Khumbu. Transitioning to solar power could significantly reduce dependence on firewood for both villages and mitigate

the costs associated with electricity. Given the potential threats posed by climate change to Everest tourism, solar energy emerges as a sustainable alternative that could enhance resilience against these challenges. Although initial installation costs for solar systems are higher than ongoing electricity expenses, they offer long-term savings by decreasing overall energy costs and diminishing reliance on traditional energy sources and environmental impacts.

Public/private infrastructure and services

Participants from both study villages reported equal access to basic services such as electricity, piped water, mobile phones, education, and healthcare; however, service quality and availability were significantly better in Namche. This aligns with previous studies (Fisher, 1990; Sherpa, 2014; Stevens, 1993), which note that only Lukla and Namche have received substantial infrastructure development and external investment. Modern toilets were present in both villages, though 26.66% of Namche and 36.66% of Thulo Gumela households still used traditional composting toilets for their manure-producing benefits. Namche residents also reported receiving technical support from national and international organizations, a resource absent from Thulo Gumela. A shared concern in both villages was the road construction from Surke to Salleri. While expected to reduce travel costs and commodity prices, participants expressed worries about potential environmental degradation, infrastructure strain, and increased tourism pressure.

While both villages have access to basic services, Namche benefits from better quality and external support. To ensure balanced development, authorities should prioritize infrastructure in Thulo Gumela and other off-route villages. The upcoming road project presents economic opportunities but also raises environmental and infrastructure concerns, underscoring the need for equitable, sustainable planning in the Khumbu region.

Natural capital

Prior to the advent of tourism in the Khumbu region, the livelihoods and activities of the Khumbu Sherpa people were primarily centered around the sustainable extraction of natural resources. The evaluation of natural capital at the household level typically considers the availability and accessibility of local resources that families utilize from their natural surroundings to support their livelihood strategies (Bennett & Dearden, 2014; Nguyen et al., 2015). In particular, for Khumbu Sherpa households, key indicators of their natural capital include soil, forests, pastures, and water resources.

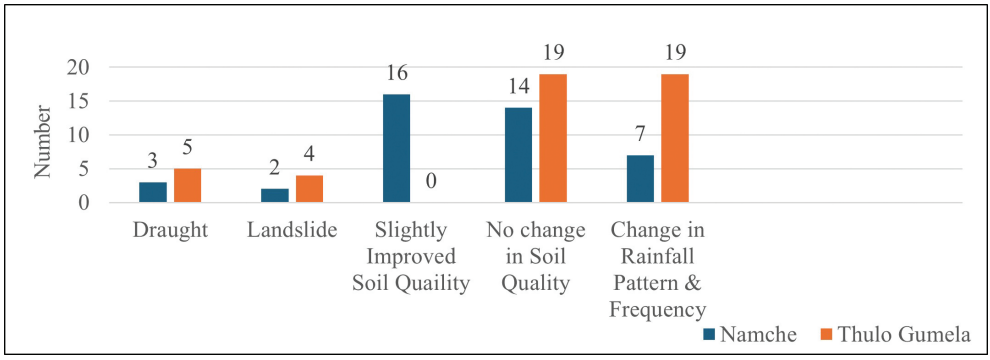
Soil

In a quest for understanding the state of soil quality within the respective study villages, participants were asked about their observations and experiences of drought and landslide; changes in soil fertility; and patterns and frequency of rainfall over the last three to seven years. Namche households are less involved in farming compared to Thulo Gumela. The results as illustrated in Figure 8 demonstrate that only 10% of the participants in Namche and 16.66 % of the participants in Thulo Gumela observed and experienced drought. Correspondingly, 6.66% of the participants in Namche and 13.33% of the participants in Thulo Gumela observed and experienced landslides. In relation to soil quality changes, only 53.33% of participants from Namche reported a slight improvement in conditions. Conversely, 46.67% of Namche participants and 63.33% from Thulo Gumela indicated that there was no change, without offering additional details regarding the soil quality or fertility in their

respective villages, nor whether these conditions had improved or declined. Also, 23.33% of the participants in Namche and 63.33% of the participants in Thulo Gumela observed and experienced changes in the pattern and frequency of rainfall and reported incidents of irregular precipitation, with less rainfall during winter and more rainfall during summer months.

Figure 8

The state of soil quality/fertility and change in the pattern and frequency of rainfall



These shifts can have profound implications for agriculture and overall soil fertility, as consistent water supply is critical for crop growth. The combined insights from these results indicate potential long-term effects on the livelihoods of Khumbu residents. Slight improvements in soil quality may not offset the negative effects of changing rainfall, posing risks to food security and agriculture, therefore requiring further research and innovative strategies.

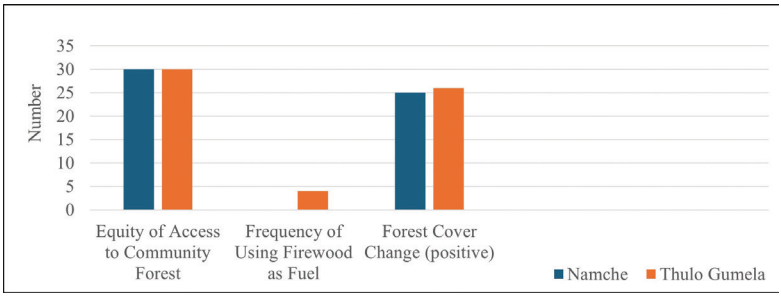
Forests

Forest products remain vital to rural livelihoods in Khumbu, with firewood, timber, and medicinal herbs playing key roles. While the creation of Sagarmatha National Park led to deforestation in Pharak, the Buffer Zone now permits limited, sustainably managed access through community forestry. Participants reported equitable forest access, though fuel usage varied: 13.33% in Thulo Gumela used firewood, while none in Namche did, with LPG preferred in both villages. Gas stoves were seen as essential, and lack of one signified economic hardship. Most Thulo Gumela households using firewood felt community forests met their needs. A majority—83.33% in Namche and 86.66% in Thulo Gumela—observed improved forest density over time.

The findings highlight challenges related to economic accessibility and resource use disparities among different communities; they also point towards successful initiatives that promote sustainable forestry management and foster positive attitudes towards forest conservation.

Figure 9

The state of forest and forest use by participants' households



However, since the costs of a gas cylinder and a gas stove are considerably expensive, households with financial difficulties may be unable to afford these.

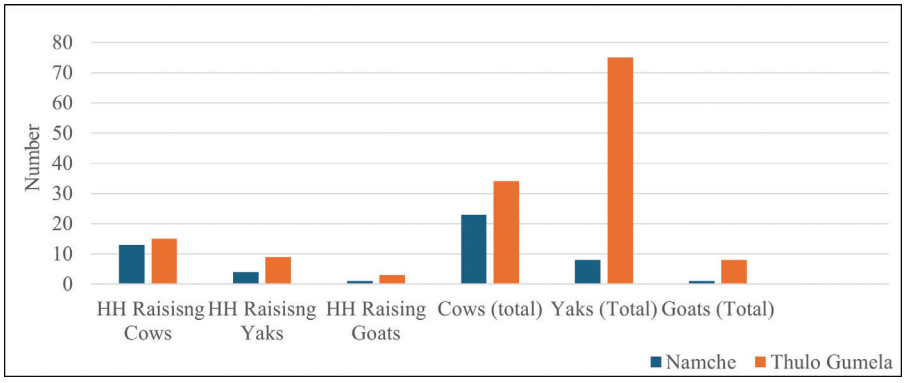
Pastures/ grazing lands

Pastures are vital for agropastoral communities as they serve as the main forage for livestock, with their quality affected by grazing frequency and herd size. Surveys revealed that in Namche, 43.33% of households owned 23 cows, while in Thulo Gumela, 50% raised 34 cows. Additionally, yaks were kept by four households in Namche (totaling eight) and nine in Thulo Gumela (totaling 75). Despite a ban on goats by SNP since the early 1980s, some households still raised them; one household in Namche had one goat, and three in Thulo Gumela had eight collectively. Participants reported challenges regarding grazing lands and livestock decline; 66.66% of Namche participants stated insufficient grazing was not a reason for stopping livestock raising, whereas 70% in Thulo Gumela cited inadequate pasture quality as a barrier. Declines were attributed to either lack of grazing land or both lack of land and labor availability: 40% of Namche participants cited the former while 60% indicated both issues; in Thulo Gumela, these figures were 33.33% and 66.66%, respectively.

Namche households benefit from Everest-route tourism and rely less on livestock, while Thulo Gumela faces limited tourism and shrinking pastures, reducing income opportunities. Targeted support in tourism and pasture management is needed to enhance livelihoods and resilience.

Figure 10

Type and number of livestock raised by participants' households



Water resources

Access to safe drinking water is crucial for health (UNWWAP, 2015). In Khumbu, piped water now serves most villages, replacing reliance on springs, rivers, and wells. Over half of participants from Namche (66.7%) and Thulo Gumela (53.3%) use piped water for backyard irrigation. However, 60% of Namche and 46.7% of Thulo Gumela residents reported occasional supply disruptions caused by natural disasters and infrastructure damage. Human factors like poor waste management also harm water quality. Some Namche households received NGO support for better water management. Despite progress, Khumbu faces ongoing challenges to water quality and supply due to climate change and dependence on glacier melt and rainfall. Sustainable management and external assistance are essential to safeguard long-term water security, especially for agriculture and livestock.

Despite improved water access, Khumbu faces challenges in water quality and supply due to natural and human factors. Dependence on glacier melt and rainfall, combined with climate change, threatens long-term water security, especially for farming and livestock. Sustainable management and external support are essential to address these risks.

Social capital

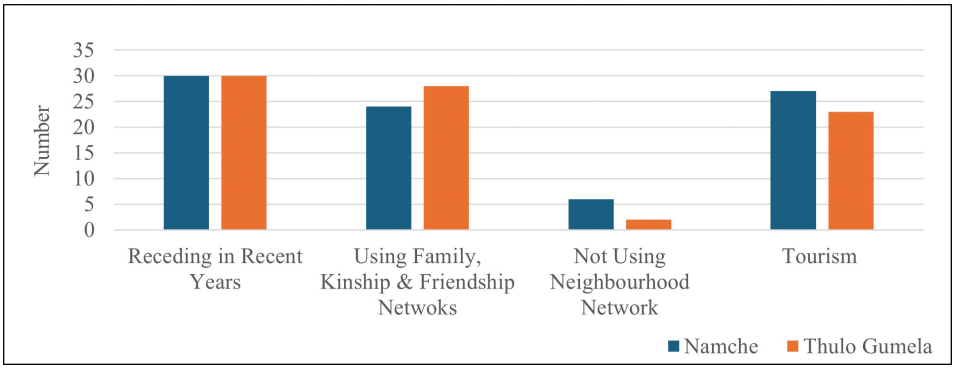
Social capital is one of the five capitals in livelihood systems, enhancing social aspects through trust, norms, rules, values, reciprocity, and networks that promote collective action for mutual benefits (Bhandari & Chang, 2013; Endris et al., 2017). Its forms vary based on community needs and social networking levels. This study focuses on the existence and size of networks among family, friends, kinship, and neighbors, as well as participation in community meetings and gatherings, to assess social solidarity among Khumbu Sherpa households and their potential for livelihood improvement.

Family, friend, kinship and neighborhood networks

In the Khumbu Sherpa community, reciprocity in goods and labor is a significant aspect of social networking (Ortner, 1978; Pandey, 1994; Sherpa, 2014). Surveys showed that traditional exchanges among family, friends, and neighbors have declined, mainly due to tourism's cash influx—cited by 90% in Namche and 76.7% in Thulo Gumela. While reciprocity was vital for household sustainability in the past, 20% of Namche and 6.7% of Thulo Gumela participants reported no longer relying on neighborhood networks.

Figure 11

Sherpas' current practice of reciprocity system and causes of its decline



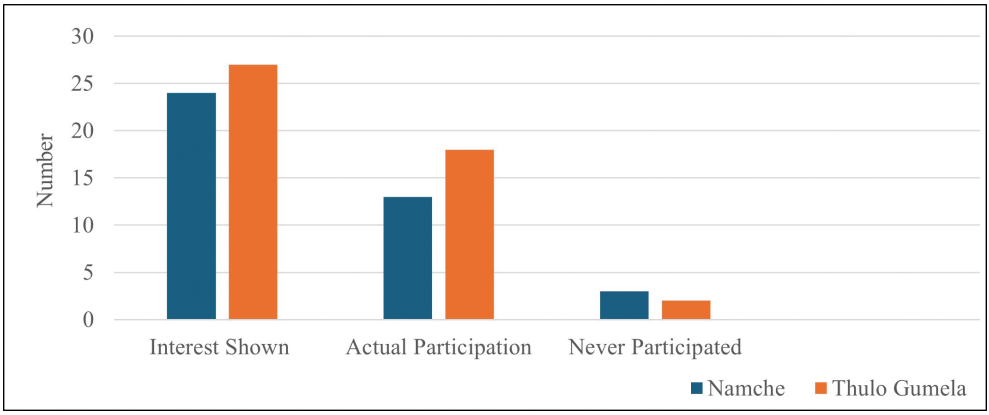
The data indicates a decline in Sherpa households' community-based networks, likely driven by tourism-related financial independence or reduced social obligations. This may challenge traditional cultural practices and affect long-term community cohesion amid ongoing modernization.

Participation in community meetings and social gatherings

The degree of involvement of people in communal and/or social work activities is also a key indicator of social capital and thus indicates the strength of relationships between social institutions and individuals within a community. In Namche, 80% showed interest in community events, with 54.16 % actual participation. Likewise, Thulo Gumela had 90% interest and 60% participation. Awareness of development initiatives was lower in Thulo Gumela (13.33%) than Namche (3.33%). While social gatherings and community meetings still occur, their frequency has declined, with 90% of Namche and 80% of Thulo Gumela participants noting this change. These events typically take place during the summer months (June to September) when tourism is less demanding, and the weather is more favorable.

Figure 12

The state of participation in community meetings and social gatherings



This indicates that there is a strong interest in community engagement within both villages, actual participation remains low. Addressing barriers to participation and revitalizing the frequency of social gatherings may enhance community cohesion and ensure that cultural practices continue to thrive.

Financial capital

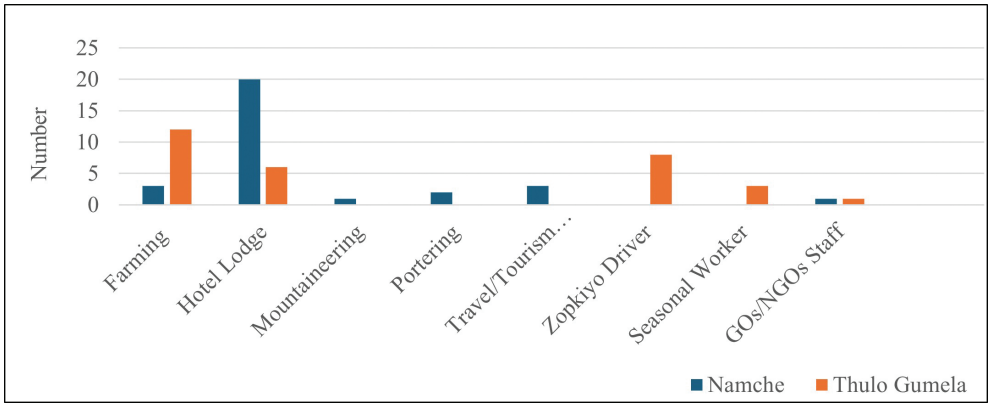
Financial capital provides individuals with access to essential monetary resources for their livelihoods (DFID, 2011; Ding et al., 2018). It is the most adaptable form of livelihood capital due to its ease of conversion into other types. In the context of Khumbu Sherpa livelihoods, financial capital encompasses economic resources including cash income (primary income source), credit (loan sources and purposes), savings (financial institutions for security), and self-perception of financial wellbeing (individual ranking of economic status within the community).

Cash/income

The survey assessed household income by identifying cash earners, types of work, and main income sources. Overall, as illustrated in Figure 13, ninety percent of the participants' households earned money from off-farm activities, while 10% relied on agriculture. Among those engaged in off-farm work, 74.07% were involved in hotel or lodge businesses, with 59.26% as owners and 14.81% as workers. Notably, only one participant (3.7%) was involved in mountaineering, and two (7.4%) in high altitude portering, a stark contrast to past trends where many Sherpas were porters and climbers. Additionally, 11.11% of participants reported income from travel and trekking agencies, while 3.7% derived Participants from the village received cash gifts and donations from family, friends, and foreign tourists. In Namche, 10% reported that they earned cash from agriculture. In Thulo Gumela, 60% relied on non-farm income while 40% depended on farming. Most agricultural households met their food needs and sold surplus locally. Thulo Gumela participants also earned from homestays (6.66%), government services (13.33%), zopkiyo transport (26.64%), seasonal work (10%), and temporary local government roles (3.33%).

Figure 13

Income source of participants' households



These findings underscore the importance of diversifying income sources and fostering community support systems in enhancing resilience among households reliant on tourism. Integrating improved agriculture with tourism and social cohesion can help ensure sustainable and adaptable livelihoods amid economic uncertainty.

Credit/debit

Historically, the Sherpa people of Khumbu relied on informal networks of kinship, friendship, and community for their financial needs, as there were no formal financial institutions. These community-based support systems fostered trust and reciprocity, facilitating socio-cultural activities. With the rise in Everest tourism, modern financial services emerged, leading to the establishment of cooperatives and banks in the region. Namche hosts two commercial banks and a cooperative linked to the Khumbu Mountain Centre project, while Thulo Gumela lacks formal financial institutions. Although participants from both villages reported no major financial issues, Thulo Gumela residents relied more on social networks for borrowing, with 63.33% favoring informal lending over traveling to Lukla or Namche and dealing with

bureaucratic hurdles.

This situation illustrates a critical transition period where informal practices coexist with formal institutions, reflecting broader socio-economic changes within the region.

Savings

Cash-saving practices are vital for managing livelihood risks, but most Khumbu villages lack formal financial institutions due to remoteness and small populations. Only Namche and Lukla offer banking services. As a result, 90% of Namche participants used local banks, while 76.76% in Thulo Gumela stored savings at home. Additionally, 10% in Namche and 23.33% in Thulo Gumela lent money informally to trusted contacts with agreed terms.

This highlights two distinct saving methods within the Khumbu Sherpa community: those with bank access utilize modern financing, while others rely on traditional practices that foster social relations and trust—key elements of their livelihood strategies. While the later system fosters trust and community ties, there may be a chance to expose individuals to risks if borrowers default on their obligations.

Conclusions

The findings of this study provide critical insights into the livelihood systems of Sherpa households in the Khumbu region, particularly highlighting the contrasting economic dynamics between Namche and Thulo Gumela. Utilizing the DFID's Sustainable Livelihood Framework (SLF), this research effectively categorized household resources into human, physical, natural, social, and financial capitals, thereby allowing for a nuanced analysis of how these assets influence livelihoods.

While Namche benefits from strong tourism-based income, its reliance on tourism raises concerns about economic resilience amid external shocks like climate change and pandemics. Thulo Gumela's diversified livelihood strategy appears more stable and sustainable. The study highlights social and economic disparities driven by unequal access to tourism, calling for targeted policies to promote equitable growth. Climate change and recent crises, such as the 2015 earthquake and COVID-19, underscore the need for a comprehensive approach to support sustainable livelihoods in the Khumbu region. To reduce tourism-related risks, authorities should promote economic diversification in Namche and support alternative livelihoods. Equitable distribution of tourism benefits and improved infrastructure in Thulo Gumela are essential for balanced development. Given the threats of climate change and pandemics, tourism policies must prioritize environmental sustainability, climate-resilient infrastructure, and adaptive strategies to protect both livelihoods and ecosystems.

This research advocates for a multi-faceted, participatory policy approach that includes local stakeholder input to ensure responsive and effective interventions. Aligning livelihoods with conservation goals is key to enhancing Sherpa community resilience and supporting the broader objectives of Sagarmatha National Park and its Buffer Zone. Policymakers are urged to adopt sustainable strategies that benefit all Khumbu villages—both along and off the main trekking route—for a resilient and thriving future.

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