Dalit’s livelihoods in Nepal: income sources and determinants

Kishor Atreya1,2 · Narayan Sharma Rimal3 · Prabina Makai3 · Manish Baidya3 · Jiban Karki3 · Gerda Pohl3 · Sunita Bhattarai3

Received: 5 February 2022 / Accepted: 15 July 2022 / Published online: 27 July 2022
© The Author(s), under exclusive licence to Springer Nature B.V. 2022

Abstract
This paper focuses on the lack of income opportunities for Dalits in Nepal, as they are the most affected group in any disaster. The presence of vulnerable family members in Dalit households may further increase their income deprivation. We therefore studied Dalit households’ income sources and identified income determinants in Gandaki Rural Municipality in Gorkha District—the epicentre of the 2015 earthquake. We observed a higher dependency of Dalit households on daily wages, livestock sales, social security allowances, and vegetables sales; however, remittance and seasonal job earnings represented the largest share of household incomes. We observed a significant difference in per capita income between farm (US$46) and non-farm (US$273) income sources, with the difference smallest in the lowest income quantile and the largest in the highest quantile. When the household head was a single woman, we observed a reduction in non-farm (by 29%) and total incomes (by 23%). Likewise, when the household head had a chronic health problem, or the household included an elderly family member, there was a reduction in the household’s income. We suggest economic interventions for Dalit households to prevent increased social exclusion in the development process, specifically focusing on vulnerable individuals and households in the lowest income quantile.

Keywords Dalit · Gorkha earthquake · Income · Purnima · Nepal

1 Introduction

Dalits are the most deprived and vulnerable social group in Nepal (Bishwakarma, 2018; Chaurasiya et al., 2019; Pariyar & Lovett, 2016) and represent about 15–20% of the total population (International Dalit Solidarity Network, 2018). The National Dalit Commission lists 26 castes as Dalits: 19 Terai Dalit castes and 7 Hill Dalit castes. Most Dalit settlements

Kishor Atreya
k.atreya@gmail.com

1 School of Forestry and Natural Resource Management, Institute of Forestry, Tribhuvan University, Kathmandu, Nepal
2 Department of Watershed Management and Environmental Science, Institute of Forestry, Pokhara Campus, Tribhuvan University, Pokhara, Nepal
3 PHASE Nepal, GPO Box 12888, Kathmandu, Nepal
are scattered (Shahi, 2018), frequently found at a distance from markets and densely populated villages. Although outlawed at present, the historical notion of “untouchability” often prevents people classified as Dalit from living in the centre of settlements. They suffer deeply rooted caste-based oppression and discrimination, including continuation of the concept of untouchability (Bishwakarma, 2017, 2018; Shahi, 2018), even in urban areas, albeit less pronounced than in rural areas (Pariyar & Lovett, 2016). Because of such discrimination, Dalits are deprived of opportunities and tend to be excluded from political, financial, and social enterprises, which leads to poor socio-economic, educational and political status (Bishwakarma, 2017). Despite several anti-discrimination laws, social protection policies, special political representation measures, and affirmative action in the development arena to include Dalit households into the development process in Nepal, studies consistently find them far behind in terms of economic well-being (Gautam & Andersen, 2016; ILO, 2005; Karki & Bohara, 2014). National statistics indicate significant income inequality between Dalit and non-Dalit households. For example, the 2011 Census estimates US$361 as the average per capita income for Dalits, compared to US$712 for non-Dalits. At present, nearly 42% of the Dalit population are living below the national poverty line (International Dalit Solidarity Network, 2018) compared to 21.6% of the total population (Ministry of Finance, 2018). They are characterized by landlessness, lack of formal education, poor health, and subsistence economy. Poor households have a low resource base, limited access to education and health care services, and may experience high levels of economic exclusion (Barrett et al., 2016; Halder & Mosley, 2004; McKay & Lawson, 2003); thus, poor households are at a high risk in any kind of environmental or socioeconomic shock and disaster (Hallegatte et al., 2020).

On 25 April 2015, a major earthquake with a magnitude of 7.8 Mw occurred in Nepal and was followed by many powerful aftershocks. Dalit households who were already struggling to meet basic needs were affected the most by being “systematically excluded” from relief and rehabilitation efforts (ACAPS, 2015). A recent study in Gorkha (Thapa, 2020) found exclusion of landless and ultra-poor families from reconstruction and livelihood recovery programmes. The Gorkha earthquake caused 8790 deaths, 22,300 injuries, and economic loss equivalent to more than US$7 billion altogether in Nepal (cited in Chaulagain et al., 2018). This estimated economic loss was immediate, but in the long run, the earthquake may further affect future human capital and is likely to affect disadvantaged groups most severely. For example, analysing the interaction between the effects of the 1988 earthquake and recent education outcomes, Paudel and Ryu (2018) found a significant loss of human capital and showed a wide gap in human capital between deprived and non-deprived caste groups. The short-term loss in the disaster can turn into long-term chronic poverty for poor Dalits if post-recovery policies exclude them. Although we observed an increasing trend of scholarly publications on the geomorphic and tectonic movement of the Himalayan region after the Gorkha earthquake (Elliott et al., 2016; Kargel et al., 2016; Mencin et al., 2016), studies on the socio-economic dimensions of the most vulnerable Dalit households are scarce.

Deeper understanding of the income of Dalit households is necessary not only to design highly contextual livelihood enhancing interventions during the post-recovery process of any disaster, but also to understand the distributional poverty dynamics (intra-group inequalities). The livelihoods of the poor follow dynamic, complex, and diverse paths (Yaro, 2002) and may be sensitive to any disaster. An understanding of income and the underlying complexities post-disaster is vital (Barrett et al., 2016) in order to develop evidence-based contextual policies and interventions (Jaggi & Müller-Böker, 2019) in the long-term development process. Inclusion of Dalit households in the recovery plan and programme
without understanding the context, capacity, and need could disrupt the socio-economic well-being of the whole community—because “elite capture” on the community resources (Gurung et al., 2013) and development programmes (Platteau, 2004) cannot be ignored and it is likely that a similar situation may exist within Dalit communities for benefits and social protection measures—thus affecting their access to income sources and incomes within the community. In this context, this study used Census survey data from Gandaki Rural Municipality (GRM), which lies at the epicentre of the 2015 Gorkha earthquake, to analyse Dalit households’ income sources and to identify factors determining household income, including the effect of the presence of vulnerable members, especially elderly people, and single women.

This paper is an important contribution to the environment versus development debate as well as the aim of sustainable development. It creates new knowledge about income poverty of Dalit communities when there are vulnerable individuals in Dalit households, and can inform policy making at different levels of government aimed at reducing income poverty by addressing the ongoing issues of social exclusion and untouchability. We find that access to off-farm income sources, though limited, has a significant share in total incomes. The difference was highest in the lowest income quantile, and vulnerable family members (for example, single women, elderly people) reduced incomes.

We will now proceed with a brief literature review, followed by a short description of the study area. The following method section describes the data and statistical analysis methods we adopted for this study. We have tabulated findings mainly to understand the correlation between income earned through various sources and factors determining farm, off-farm, and total incomes. The paper, before stating conclusions, discusses findings in relation to the existing literature and intervention dynamics and their overall policy implications.

2 Literature review

Nepal’s multi-ethnic society with a high diversity of caste groups has been described since the fifth century (Vishwakarma, 2002); however, the present caste hierarchy was established in 1769 and legalized in 1854 (Lam et al., 2019; Upreti, 2010), which leads to debates in the political and development arena. Caste is a significant determinant of life opportunity (Mosse, 2018), and discrimination and inequality due to caste systems may thwart efforts to achieve the Sustainable Development Goals (Shanmugavelan, 2019). Caste is a social structure that causes inequality and poverty even in today’s free market economy (Thorat & Madheswaran, 2018), because prior policymakers and politicians treated caste as a static or residual sociocultural problem rather than a dynamic relational problem (Mosse, 2018). When an area is hit by a disaster such as an earthquake, the caste system may determine the extent of social exclusion of individual households and thus their access to development-led services, including emergency relief, safety nets, social protection, and government programmes and plans—collectively affecting household income. The dimensions of poverty, shocks, and livelihood interventions (Fig. 1) we used is a modification of Matin and Hulme (2003), which illustrated how poor households become ultra-poor after a disaster, and intervention types they may need in terms of post-disaster recovery plans. Investigating social vulnerability to earthquake-related income change is important in order to identify and disaggregate the poorest among the poor because disasters increase their vulnerability by damaging livelihood opportunities and access to existing services, marginalizing and
Disempowering them (DiCarlo et al., 2018; Hallegatte et al., 2020). For example, Lam and Kuipers (2019) found an exclusion of the poorest of the poor in the reconstruction and recovery process in Nepal. In such disasters, the literature suggests multistep and multidimensional interventions for the recovery process, including emergency support to control sudden poverty, livelihood protection mechanisms (such as grants, immediate loans, and basic health care), and livelihood promotion programmes (skills development, cash for work, and access to finance and government services) to enhance economic well-being (Matin & Hulme, 2003). However, access to these livelihood opportunities (and economic goods) depends on households’ capabilities, and research suggests that household income could predict household capability (Wagle, 2005). As the household income inversely correlates with economic exclusion (Renahy et al., 2012), deprivation of Dalits from income sources can be a key determinant for other forms of exclusion such as limited access to social protection and to earthquake recovery services.

Diverse factors, including household economic behaviour and locational endowments, determine household income—both from farm structure and non-farm activities. For example, the average annual income estimated for Dalit households in the Karnali region was approximately US$1371 (Nepali, 2018) but that of Humla District within the Karnali region was US$500 (Gautam & Andersen, 2016), a sign that geographical and socio-economic context may affect household income. Likewise, young Nepalese are moving away from farming to non-farm activities, especially in-country seasonal labour and international labour. However, Dalit households’ capability to access such opportunities is much lower (Sunam, 2014). Further, it is likely that vulnerable family members such as elderly people, single women, infants, people with disabilities (PwDs), and chronically sick family members in Dalit households may negatively affect household capability and income.

Fig. 1 Dimensions of poverty, shocks, and livelihood intervention (modified from Matin & Hulme, 2003)

1 [1US$ is approximately 110 Nepali rupees (NPR)].
In the absence of men, for example, women take responsibilities in households and they have a high risk of caste as well as gender-based discrimination (Kabeer, 2000; Mosse, 2018; UNDP, 2008) and are often excluded from paid work, which could reduce household income. Likewise, household income is associated with poor health conditions of the household members and vice versa (Mitchell & Bates, 2011; Singh & Singh, 2008). The presence of one family member with ill health can reduce household productivity because it requires at least an extra member to look after the sick person; in addition, the household needs to carry the extra burden of treatment costs (Gupta & Chowdhury, 2014; Saito et al., 2016). There is only limited data on the effect of the presence of sick household members on Dalit households’ economic well-being. We therefore conducted this study to gain a deeper understanding of poverty dynamics in Dalit households, and the results of the study may apply to other regions within and beyond Nepal and serve to address income poverty among Dalit households and perhaps other vulnerable groups, for example PwDs, too.

3 Methodology

3.1 Study area

Gandaki Rural Municipality (about 124 km²) lies in the Gandaki Province of Nepal. It is divided into 8 Wards—the smallest administrative unit (Fig. 2a). It lies about 80 km west of Kathmandu, opposite the market town of Benighat along the Prithvi Highway. It was
not however accessible on motorable roads until 2014 because of the barrier formed by the Himalayan-fed Trishuli and Budi Gandaki rivers (Fig. 2b, c). The construction of a bridge over the Trishuli River at Benighat connected the municipality to Prithvi Highway, helping to develop economic activities and trade, mainly agricultural production, for Kathmandu’s markets. The municipality receives approximately 1900 mm of precipitation per year. Elevation ranges from 270 to 1707 m above sea level. Agriculture in lower elevations, especially along the riverways and road corridors, is highly intensified, and heavy use of chemical pesticides and fertilizers is common for crop production, especially vegetables. Agriculture in higher elevations mainly comprises maize and millet in summer and potato in winter. Internal migration is clear from higher elevation to lower, or elsewhere, and migration of (mostly male) young adults for labour/high-risk work in Golf countries even for minimal wages has created local labour shortages and led to increased workloads for female-headed households.

The municipality has 5763 households and a population of 32,145 population (Census report, PHASE Nepal 2020). Agriculture (27%), small-scale business (5%), salaried employment (9%), labour wages (5%), and foreign employment (6%) are the main occupations of the inhabitants of the study area. On average, households own 3 Ropani (1 Ropani = 500 m²) Khet land (lowland, irrigated agricultural land) and 4 Ropani Bari land (upland, rainfed agricultural land). Rice, maize, potato, pulses, and vegetables are the main crops. Cow, buffalo, goat, poultry, and pig are the farm animals found in the study area. Households’ livelihoods, especially for the poor and food insecure, also depend on the practice of land leasing [renting land for agricultural crop production, providing either (1) a fixed annual monetary amount (leased in) or (2) half of the agricultural produce (Adhiya) to the landowner]. The use of firewood for cooking is common. Most of the population follow the Hindu religion; however; Christians and Buddhists can also be found. The municipality is characterized by its high ethnic diversity and disadvantaged groups like Dalits. Brahmin, Chhetri, and Thakuri (BCT) are the largest (25%) ethnic group in the municipality, followed by the ethnolinguistic Magar group (18.3%) and the disadvantaged Dalit group (14.3%) (Fig. 3). Access to services and inputs, markets and livelihood opportunities is still problematic, especially for the poorest and most marginalized members of communities.

3.2 Data collection

This study used data from a 2019 household survey that conducted interviews with nearly all households (a kind of Census survey) living in the municipality, which was conducted by PHASE Nepal, a national NGO, in collaboration with the municipality in the framework of the DFID-funded and Mott MacDonald-managed “Purnima Programme: Leave No One Behind”. The aim of the Purnima Programme was to identify vulnerable population groups and improve their livelihoods in the earthquake recovery and reconstruction process. The Census included a household census tool and a screening tool to establish whether any household members fell into the category of vulnerability. If any of these criteria were found to apply, a detailed questionnaire was added for each household meeting any of the vulnerability criteria and one for each specifically vulnerable household member. The Census study received ethical approval from the Nepal Health Research Council (Registered # 146/2019). All respondents were informed about the research objectives and their right to withhold information.

The involvement of People with Disability (PwD) in the Census, and the collection of information regarding their health conditions including disabilities and assistive devices
to assess their vulnerability prompted us to seek approval from the Council. This research, however, explains socio-economic aspects of vulnerable Dalit households under the broad assessment of the prevalence of vulnerable households in order to identify the most suitable interventions for the Purnima Programme.

The Census data reported here are primarily those regarding the income of and individuals’ vulnerabilities within Dalit households. The Census identified 826 Dalit households in the municipality. It provided data on income from the following 10 sources: cereal crop sale, vegetable sale, milk and milk product sale, livestock sale, non-timber forest product sale, daily wage, salaried jobs, remittances, pension / social security, and non-farm business. Figure 2b shows the geographical distribution of the data for 795 households from the Census. The Census considered the amount of money that a household received in return for the above services, sales of goods and from investment over the last 12 months, the gross cash income that can be spent (consumed) immediately, and ignored household consumption of own agricultural products in its data collection.

### 3.3 Statistical analysis

For this study, we regrouped income into three categories: farm income (the sum of the initial four sources mentioned above), non-farm income (the sum of the remaining six sources), and total income (the sum of both farm and non-farm income). Besides frequency
and descriptive statistics, we estimated the bivariate Pearson correlation between (1) income from various sources and (2) farm, non-farm, and total income by income quantiles. Further, we used ordinary least square regression to identify factors determining farm, non-farm, and total income. The dependent variables (farm, non-farm, and total income) were highly skewed (a large majority on the low-income side) and therefore log-transformed. We arrived at a robust OLS equation (Eq. 1) using the “stepwise” method primarily for total income, then we looked at the effect of the same determinants on farm and non-farm income. Independent variables used in the regression analysis are provided in Table 1, with their expected relationship with dependent variables and justification.

\[
\text{INCOME} = \beta_1 \text{AGE} + \beta_2 \text{SWOMEN} + \beta_3 \text{DISEASE} + \beta_4 \text{AGRILEASE} + \beta_5 \text{LSU} + \beta_6 \text{MALE} + \beta_7 \text{FEMALE} + \beta_8 \text{ELDER} + \beta_9 \text{INSOURCE} + \beta_{10} \text{TV} + \epsilon_i
\]  

(1)

We further divided households into 10 income quantiles to understand distributional effects on the relationships between farm, non-farm, and total income. The statistical test was done at the 95% confidence level. As the dependent variables are log-transformed, interpretation of the regression coefficients is not straightforward. Hence, the percentage change in income \( (y_i) \) by one-unit change in independent variables \( (k_j) \) were estimated by exponentiating the respective coefficient \( (\beta_j) \) following Eq. 2 (Ford, 2018).

\[
\% \text{ change in } y_i = (e^{\beta_{ij}} - 1) \times 100
\]  

(2)

4 Results

4.1 Respondent characteristics and income descriptive

51% of respondents were females, and the average age was 45 years (Table 2). Approximately two-third of respondents identified agriculture as their main occupation, followed by daily wage labour (20.5%). A few were involved in seasonal jobs (6.3%), small businesses (5.2%) and migrant labour (1.8%). Literacy levels were well below the national average: More than 28% of respondents reported they could not read and write at all, and in addition, a similar number of respondents never attended school but reported being able to read and write.

The number of Dalit households reporting on all income sources and their descriptive statistics is provided in Table 3. More than half of the total households (52%) had income from daily wages, followed by livestock sales (47%), pension / social security (32%), and vegetable sales (31%). Less than one percent (2 households) had income from the sale of non-timber forest products, 3% from the sale of milk and milk products, and 5% from the sale of cereal crops. Among all the income sources, however, remittances and salaried jobs made up the largest share of income in those households who had access to these income sources. For instance, the share of remittances (in 153 households) and salaried jobs (in 232 households) income in the total household income was 65% and 59%, respectively. Nearly 20% of all households reported remittance income at an annual average of US$3049 (median 2273).

The median farm income was US$214 against non-farm income of US$1373. The average household annual and per capita income estimated was US$2336 (median 1509) and US$466 (median 309), respectively (Table 4). We observed a substantial difference in the
| Determinants | Explanation | Expected hypothesis | Justification |
|--------------|-------------|---------------------|---------------|
| AGE | Respondents’ age in years | – | + | – | Younger individuals are more likely to engage in multiple sources of income, especially non-farm income (McNamara & Weiss, 2005) |
| SWOMEN | Respondent is a single woman (if YES 1, 0 otherwise) (not necessarily female widow) | – | – | – | In the absence of men, women take responsibilities of households and are at risk of discrimination (Mosse, 2018; UNDP, 2008) and out of labour force which may reduce household income |
| DISEASE | Respondent suffered from self-reported illness at the time of survey (if YES 1, 0 otherwise) | – | – | – | Diseases included are both curable (such as ulcer, gastritis, skin problem) and chronic conditions (such as hypertension, diabetes, and asthma). Bad health decreases human productivity (Mitchell & Bates, 2011) |
| AGRILEASE | Leased land for crop production (if YES 1; 0 otherwise) | + | + | – | Income from leased agricultural land (sharecropping) is an addition to the household’s farm and total income |
| LSU | Livestock Unit—the aggregate number of different categories of livestock | + | + | – | Livestock unit (LSU) was calculated following (FAO, 2011) guidelines. The higher the LSU, the higher will be the farm and total income, but not necessarily non-farm income |
| MALE | Total men in the household | + | + | + | In a male-dominated society, men are major earners |
| FEMALE | Total women in the household | + | + | – | An increasing role of females in agriculture has been reported (Gartaula et al., 2010) |
| ELDER | Number of household members aged 60 years and above | – | – | – | When one gets old, a decline in human productivity due to increased risk of illness and injury is possible (Ghimire et al., 2019)—resulting in a reduction of income |
| INSOURCE | Number of income sources (out of 10) | + | + | + | The more income sources, the higher will be the household income (Khatiwada et al., 2017) |
| Determinants | Explanation | Expected hypothesis | Justification |
|--------------|-------------|---------------------|---------------|
| TV           | Household with television (if YES 1, 0 otherwise) | + | + | + | Television in a Dalit household may signal social and economic “status”, a better-off family than one who does not own a tv (Sunam, 2014) |
Table 2  Characteristics of respondents

| Characteristics                        | Number of respondents |
|----------------------------------------|-----------------------|
| Female %                               | 50.7                  |
| Average age                            | 44.7                  |
| Average number of individuals in a Dalit house | 5.19                  |
| Occupation (%)                         |                       |
| Agriculture                            | 64.6                  |
| Labour wage                            | 20.5                  |
| Job                                     | 6.3                   |
| Business                                | 5.2                   |
| Foreign employment                      | 1.8                   |
| Student                                 | 1.6                   |
| Education (%)                          |                       |
| Cannot read/write                      | 28.2                  |
| Informal education                     | 28.5                  |
| Primary                                 | 26.1                  |
| Secondary                               | 14.3                  |
| Higher Secondary                        | 2.5                   |
| Bachelor                               | 0.5                   |

Table 3  Dalit household’s annual income in the Gandaki Rural Municipality (US$)

| Income category          | Income source               | No. of Household | Min | Max  | Mean | Median | Std. Deviation of Mean |
|--------------------------|-----------------------------|------------------|-----|------|------|--------|------------------------|
|                          |                             |                  |     |      |      |        |                        |
| Farm income              |                             |                  |     |      |      |        |                        |
|                          | Livestock sales             | 370              | 9   | 5455 | 258  | 145    | 430                    |
|                          | Vegetable crop sales        | 248              | 18  | 4545 | 388  | 182    | 589                    |
|                          | Cereal crop sales           | 42               | 9   | 318  | 79   | 64     | 69                     |
|                          | Milk and milk product sales| 21               | 18  | 818  | 123  | 91     | 167                    |
|                          | Sub-total (farm income)     | 458              | 9   | 7273 | 431  | 214    | 670                    |
| Non-farm income          |                             |                  |     |      |      |        |                        |
|                          | Day labour                  | 414              | 9   | 6364 | 992  | 545    | 1004                   |
|                          | Pension/social security     | 251              | 36  | 8909 | 332  | 218    | 720                    |
|                          | Paid employment             | 232              | 91  | 16,909| 2161 | 1818   | 2192                   |
|                          | Remittances                 | 153              | 91  | 18,182| 3049 | 2273   | 3239                   |
|                          | Business other than agriculture| 91              | 45  | 6545 | 1642 | 1091   | 1514                   |
|                          | NTFPs sales                 | 2                | 73  | 77   | 73   | 73     | -                      |
|                          | Sub-total (non-farm income) | 760              | 9   | 23,073| 2184 | 1373   | 2824                   |
| Total                    |                             | 795              | 27  | 25,727| 2336 | 1509   | 2932                   |

Table 4  Per capita income disaggregated by farm and non-farm (US$)

| Income category          | Min | Max | Mean | Median | Std. deviation of mean |
|--------------------------|-----|-----|------|--------|------------------------|
| Farm                     | 1.8 | 1927| 98   | 46     | 176                    |
| Non-farm                 | 3.6 | 3636| 428  | 273    | 467                    |
| Total                    | 4   | 4073| 466  | 309    | 493                    |
average per capita income between farm (US$46) and non-farm income sources (US$273). It is noteworthy to mention that the difference was slight in the lowest 10% income quantile households, which increased exponentially in the higher quantiles, and finally extends to maximum (and sharply!) in the highest 10% quantile households (Fig. 4).

4.2 Correlations among income from various sources

The bivariate Pearson correlation analysis (Table 5) showed positive and significant associations between income from cereal crop and vegetables ($r=0.423$, $p<0.05$), and non-farm business ($r=0.956$, $p<0.05$). This is probably related to landholding size. Those who own sufficient agricultural land not only receive money from selling cereal crops but also practice commercial vegetable production and probably were involved in business other than agriculture. We also observed positive associations between income from vegetable sales and livestock sales ($r=0.192$, $p<0.05$), and remittances ($r=0.149$, $p<0.05$). It is likely that remittances were used in commercial vegetable production and animal rearing. Income from livestock was also positively associated with day labour ($r=0.234$, $p<0.05$), showing that households engaged in day labour may raise small livestock, such as poultry, as an additional source of income. Income from day labour, remittances ($r=0.308$, $p<0.05$), and non-farm business ($0.461$, $p<0.05$) are positively associated. A positive and significant association between income from remittances and pensions ($r=0.346$, $p<0.05$) was also observed. Either family members from the pensioner’s house may work abroad, or the pensioners themselves were working overseas (for example, after retiring from the army). We did not observe significant associations between earning from salaried jobs and other income sources, which may suggest that regular wage earners do not invest their earnings.
Table 5 Correlation among income from various sources

| Income Sources          | Vegetable crop sales | Milk and milk product sales | Livestock sales | Day labour | Job | Remittances | Pension/social security | Business other than agriculture |
|-------------------------|----------------------|-----------------------------|----------------|------------|-----|-------------|-------------------------|---------------------------------|
| Cereal crop sales       | 0.423*               | .a                         | −0.352         | 0.178      | −0.065 | 0.296       | −0.094                 | 0.956*                          |
| Vegetable crop sales    | 1                    | 0.395                       | 0.192*         | 0.159      | 0.114  | 0.429**     | 0.009                  | 0.342                           |
| Milk and milk product sales | 1                  | 0.132                       | 0.369          | −0.559     | 0.991  | 0.109       | −0.240                 |                                 |
| Livestock sales         | 1                    | 0.234**                     | 0.139          | 0.000      | −0.018 | 0.078       |                        |                                 |
| Day labour              | 1                    | 0.202                       | 0.308*         | −0.052     | 0.461* |                         |                        |                                 |
| Job                     | 1                    | −0.028                      | 0.001          | 0.224      |        |             |                        |                                 |
| Remittance              | 1                    | 0.346*                      | −0.376         |             |        |             |                        |                                 |
| Pension/social security | 1                    | −0.196                      |                |             |        |             |                        |                                 |

*,**Significant correlation at the 0.05 and 0.01 levels, respectively

*aIndicates data limitation because at least one of the variables is constant
in other forms of income generation. Sometimes, the correlation coefficient of salaries is negative, though non-significant, with other sources. Likewise, no statistically significant correlation between the income from milk and milk product sales with other sources was observed.

We also analysed correlations among farm, non-farm, and total income by income quantiles (Table 6). Overall, we observed direct associations among all; the relationship was: (1) high between non-farm and total income \( (r=0.985, p<0.05) \); (2) medium between farm and total income \( (r=0.351, p<0.05) \); and (3) low between farm and non-farm income \( (r=0.196, p<0.05) \). By quantiles, correlation between farm and total income was positive and significant in the lowest first quantile \( (r=0.448, p<0.05) \) and the second highest 9th quantile \( (r=0.292, p<0.05) \), but negative in the highest 10% quantile \( (r=-0.048, p>0.05) \). Likewise, a significant association between non-farm and total income was found in all quantiles. We observed a significant inverse relationship between farm and non-farm income in all quantiles; however, it is insignificant in the lowest 10% quantile.

4.3 Factors determining household income

Descriptive statistics of the variables, both dependent and independent, used in the regression analysis are provided in Table 7. Approximately 9% of respondents were single women, and about one in five respondents suffered from diseases such as hypertension, diabetes, chronic lung disease, and others. More than one fifth of the total households (22%) had leased agricultural land. Livestock units ranged from none to 14, with an average value of 1.14. Gender was balanced in Dalit households with about 3 male and 3 female members on average, and a maximum of 3 elderly members. Income sources ranged from 1 to 7, the mean value was 2.34. Less than half of the households (47%) possessed a television set. The regression results showed that AGE (age of household head), SWOMEN (household head single woman), DISEASE (household head suffering from chronic illness), AGRILEASE (leased agricultural land), LSU (number of livestock units), ELDER (number of elderly household members) correlated negatively with household total income; and MALE (number of male household members), FEMALE (number of female household members), INSOURCE (number of income sources), and possessing a

| Income quantile (Q) | Total and farm | Total and non-farm | Farm and non-farm |
|---------------------|---------------|-------------------|------------------|
| Q1                  | 0.448*        | 0.877**           | −0.158           |
| Q2                  | 0.121         | 0.512**           | −0.805**         |
| Q3                  | 0.03          | 0.289*            | −0.762**         |
| Q4                  | −0.025        | 0.363**           | −0.816**         |
| Q5                  | −0.045        | 0.351**           | −0.748**         |
| Q6                  | −0.134        | 0.317**           | −0.738**         |
| Q7                  | 0.031         | 0.412**           | −0.759**         |
| Q8                  | 0.07          | 0.387**           | −0.725**         |
| Q9                  | 0.292*        | 0.345**           | −0.585**         |
| Q10                 | −0.048        | 0.917**           | −0.346*          |
| Overall             | 0.351**       | 0.985**           | 0.196**          |

*,**Significant correlation at the 0.05 and 0.01 levels, respectively
TV correlated positively (Table 8). Likewise, four correlations were found to be statistically significant for farm income: LSU (+ve), MALE (−ve), INSOURCE (+ve), and TV (+ve). Except AGE and DISEASE, all factors were found to significantly affect non-farm income as above. The marginal effects of these factors, estimated through Eq. 2, are provided in Table 9. For example, income was considerably reduced—total income by 23% and non-farm income by 29%—when the Dalit household was headed by single women, while this had no effect on farm income.

### Table 7  Descriptive statistics of the variables used in the regression analysis

| Determinants | Min | Max  | Mean (± standard deviation) | Total income | Farm income | Non-farm income |
|--------------|-----|------|-----------------------------|--------------|-------------|-----------------|
| AGE          | 14  | 90   | 44.78 (15.518)              | 44.34 (14.681) | 44.98 (15.646) |
| SWOMEN       | 0   | 1    | 0.09 (0.280)                | 0.07 (0.260)  | 0.09 (0.284)  |
| DISEASE      | 0   | 1    | 0.17 (0.375)                | 0.19 (0.390)  | 0.17 (0.375)  |
| AGRILEASE    | 0   | 1    | 0.22 (0.412)                | 0.28 (0.450)  | 0.21 (0.410)  |
| LSU          | 0   | 13.90| 1.15 (1.112)                | 1.51 (1.149)  | 1.14 (1.118)  |
| MALE         | 0   | 8    | 2.56 (1.328)                | 2.63 (1.294)  | 2.57 (1.331)  |
| FEMALE       | 0   | 7    | 2.56 (1.344)                | 2.62 (1.360)  | 2.59 (1.346)  |
| ELDER        | 0   | 3    | 0.45 (0.706)                | 0.47 (0.723)  | 0.46 (0.713)  |
| INSOURCE     | 1   | 7    | 2.34 (1.164)                | 2.96 (1.053)  | 2.38 (1.116)  |
| TV           | 0   | 1    | 0.47 (0.499)                | 0.51 (0.500)  | 0.46 (0.499)  |

*aDeterminants are explained in Table 1*

### Discussion

Prior studies have already established distinct relationships between disaster, people’s vulnerability and development (Bankoff et al., 2013), and it is an accepted fact that the poor are more vulnerable to disasters (Hallegatte et al., 2020). In the aftermath of a disaster, an influx of resources for immediate relief, and then in the long run, integrated projects to improve livelihoods, and to restore social capital and market economy is evident in various cases (Schilderman & Lyons, 2011). The livelihood-enhancing interventions designed for affected people in the process of reconstruction and recovery may not work equally well for the poor—because they are less able to benefit from livelihood interventions (Halder & Mosley, 2004; Montesquieu et al., 2014). If livelihood recovery programmes after disasters do not develop evidence-informed interventions, tailor-made and contextualized for the poor and vulnerable people, marginalized people may be trapped in chronic poverty.
Table 8  Results of linear regression analysis (dependent variables are log transformed)

| Determinants† | Total income |          |          |          | Farm income |          |          |          | Non-farm income |          |          |
|---------------|--------------|----------|----------|----------|-------------|----------|----------|----------|-----------------|----------|----------|
|               | Unstandardized coefficients | Unstandardized coefficients | Unstandardized coefficients | Unstandardized coefficients | Unstandardized coefficients |          |          |          |                  |          |          |
|               | B             | Std. Error | \( t \) test | Sig     | B             | Std. Error | \( t \) test | Sig     | B             | Std. Error | \( t \) test | Sig     |
| Constant      | 2.573         | 0.061     | 42.205 | 0.000 | 1.919         | 0.090     | 21.345 | 0.000 | 2.614         | 0.071     | 37.012 | 0.000 |
| AGE           | 0.003         | 0.001     | -2.386 | 0.017 | 0.000         | 0.002     | 0.063 | 0.950 | -0.003        | 0.001     | -1.897 | 0.058 |
| SWOMEN        | -0.260        | 0.055     | -4.703 | 0.000 | 0.015         | 0.081     | 0.183 | 0.855 | -0.340        | 0.063     | -5.385 | 0.000 |
| DISEASE       | -0.090        | 0.040     | -2.248 | 0.025 | -0.021        | 0.053     | -0.404 | 0.686 | -0.060        | 0.046     | -1.308 | 0.191 |
| AGRILEASE     | -0.096        | 0.037     | -2.624 | 0.009 | 0.049         | 0.046     | 1.077 | 0.282 | -0.122        | 0.043     | -2.861 | 0.004 |
| LSU           | -0.058        | 0.015     | -3.889 | 0.000 | 0.080         | 0.019     | 4.321 | 0.000 | -0.075        | 0.017     | -4.408 | 0.000 |
| MALE          | 0.043         | 0.013     | 3.446  | 0.001 | -0.045        | 0.018     | -2.511 | 0.012 | 0.065         | 0.014     | 4.523  | 0.000 |
| FEMALE        | 0.037         | 0.012     | 3.164  | 0.002 | -0.008        | 0.016     | -0.512 | 0.609 | 0.030         | 0.014     | 2.215  | 0.027 |
| ELDER         | -0.075        | 0.026     | -2.884 | 0.004 | -0.064        | 0.034     | -1.889 | 0.060 | -0.084        | 0.030     | -2.766 | 0.006 |
| INSOURCE      | 0.226         | 0.014     | 16.298 | 0.000 | 0.127         | 0.021     | 6.076  | 0.000 | 0.176         | 0.016     | 10.898 | 0.000 |
| TV            | 0.192         | 0.031     | 6.294  | 0.000 | 0.200         | 0.042     | 4.793  | 0.000 | 0.193         | 0.035     | 5.437  | 0.000 |

Model summary
- N = 782; \( R^2 = 0.388 \); Adjusted \( R^2 = 0.380 \); Standard Error of Estimate = 0.405; F test = 48.782, \( p < 0.001 \)
- N = 455; \( R^2 = 0.180 \); Adjusted \( R^2 = 0.162 \); Standard Error of Estimate = 0.429; F test = 9.749, \( p < 0.001 \)
- N = 748; \( R^2 = 0.299 \); Adjusted \( R^2 = 0.289 \); Standard Error of Estimate = 0.458; F test = 31.432, \( p < 0.001 \)

†Determinants are explained in Table 1
To contribute to the evidence informing post-disaster long-term development processes, this study assessed income sources, income inequality by quantiles, and income determinants among Dalits—who are one of the most vulnerable social groups in Nepal—analysing Census data from Gandaki Rural Municipality in Gorkha District.

5.1 Farm versus non-farm income

We found that non-farm income contributed a greater share to income in Dalit households, consistent with earlier studies elsewhere (Barrett et al., 2001, 2016). Earnings from salaried jobs and migrant labour added the most to household income. Dalits in the study area are less likely to have (1) forest-based income, (2) dairy cattle, and (3) agricultural land. The income gap between farm and non-farm income was minimal in the lowest 10% quantile households and significant in the highest 10% quantile households (Fig. 4). The most notable finding from the correlation matrix is that of the association between farm and non-farm income—which was positive in aggregate, but found to be consistently negative when households were disaggregated by income quantiles (see Table 6). Thus, the association between farm and non-farm income is not straightforward for the poor, it is contextual, diverse, and contingent on household endowment. This may indicate a high volatility of farm and non-farm income sources (uncertain income streams) for the poorest of the poor. It demonstrates the limited scope for increasing income from farming in the area, which means that only non-farm activities lead to obtaining higher household incomes.

5.2 Determinants of household income

Diverse factors, including household economic behaviour and locational endowments, determine farm and non-farm income. Studies reported a high volatility of income for the poor. This study only accounted for immediate cash—“current income”—of the earthquake-affected Dalit households, so future income dynamics and their determinants in the study area may be different, and in addition, the study findings may not be comparable with

| Determinants | Income categories |
|--------------|-------------------|
|              | Total income | Farm income | Non-farm income |
| AGE          | −0.3**      | <0.1        | −0.3           |
| SWOMEN       | −22.9*      | 1.5         | −28.9**        |
| DISEASE      | −8.6**      | −2.1        | −5.9           |
| AGRILEASE    | −9.2*       | 5.1         | −11.5**        |
| LSU          | −5.6**      | 8.4**       | −7.3**         |
| MALE         | 4.4**       | −4.4*       | 6.7**          |
| FEMALE       | 3.8**       | −0.8        | 3.1*           |
| ELDER        | −7.2**      | −6.2        | −8.0**         |
| INSOURCE     | 25.4**      | 13.6**      | 19.2**         |
| TV           | 21.2**      | 22.1**      | 21.3**         |

*And ** indicate significant correlation at the 0.05 and 0.01 levels, respectively
a Determinants are explained in Table 1

(see Fig. 1)
other areas. With this cautionary note, we will now describe several factors (see Table 1) relating to Dalit household income in the study area.

As the age of the household head increases by 1 year, the total income is reduced by 0.3%, possibly because younger individuals prefer non-farm activities (McNamara & Weiss, 2005). Out-migration of younger individuals in search of better opportunities after the earthquake may have forced older members to engage in farm activities more.

Dalit women suffer intense, multidimensional discrimination: being a Dalit, being a woman, and being a Dalit woman (Mosse, 2018; UNDP, 2008), to this, we add one more—being a single Dalit woman—altogether making them the worst-off members of the community. As household heads, such single women have to perform household chores and farm activities; they seem to be largely excluded from non-farm economic opportunities and suffer many other deprivations (Chaurasiya et al., 2019; Devkota et al., 2017; Kanel, 2018; Sharma-Gautam & Hearn, 2019).

We also observed a reduction in total income (by 8.6%) when the household head in Dalit households suffered from illness. This is intuitive, especially for the poorest households. Bad health is likely to reduce household productivity (Mitchell & Bates, 2011), and in serious cases, not only prevents the affected member from contributing to household income but also places an additional burden on carers and forces households into deeper poverty when the financial burden of illness is substantial (McIntyre et al., 2006). Dalits are more prone to illness (Kabir et al., 2018). For example, a hospital-based study (Bhandari et al., 2014) observed the highest (50%) prevalence of chronic obstructive pulmonary disease (COPD) in Dalits, whereas another study found more mental health issues in Dalits (Kohrt et al., 2012). Such health complications may be measured directly in relation to household income reduction, as there is a close interrelationship between health and poverty (Grant, 2005), which appears to be worse among minority ethnic groups (Salway et al., 2007).

Approximately one out of five Dalit households had leased agricultural land for crop production. Unexpectedly, we found a reduction in the non-farm (by 11.5%) and total income (by 9.2%) in those households, but no effect on the farm income. These households may own limited land and thus have leased less fertile land from non-Dalit higher income class households, and the income contribution of the crops grown on such land may be purely for subsistence. Khanal (2019) clearly stated that sharecropping is one strategy for Dalit households to meet their basic nutrition requirements. Intensification of such land is less likely because adoption of high value economic crops after the earthquake favoured better-off farmers (DiCarlo et al., 2018). Further, Dalit households who practice sharecropping may also have been excluded from non-farm economic opportunities (day labour, for example), as they have to perform domestic chores on the proprietors’ farms. Studies (Gautam & Andersen, 2017; Gentle et al., 2018; Khanal, 2019) stated that sharecropping is a primary activity in poor households because of the lack of other opportunities, and often this may increase their vulnerability to any kind of future shocks because they need to invest all their resources in the farming activities. We may conclude that in this Dalit community, poor households leased additional agricultural land when they had no other income options and used it mainly for subsistence—however, this relationship may also differ by location as the endowment and entitlement of the agricultural lands and other resources, including farm animals, affect the farming dynamics of poor households.

Livestock farming (LSU) inversely correlated with non-farm and total income, but positively with farm income. It indicates that those whose income derives significantly from livestock have lower incomes overall, but are relatively higher earners among those who largely depend on farm income. Yang et al. (2018) in China argue that farm animal
husbandry does not increase overall household income. Having greater numbers of livestock may prevent households from participating in non-farm income-generating activities, as much of their time is taken up by caring for livestock. However, it is important to note here that farm animals are vital to the ultra-poor (Maltosoglou & Taniguchi, 2004); however, they may not be able to afford a large number of bigger animals but raise smaller poultry and goats instead. We observed that 68% of the total income and 94% of the farm income came from livestock in the lowest income quantile—suggesting a significant share of farm animals in the total income of the poorest of the poor Dalit. These figures for the highest income quantile were only 4% and 37%, respectively.

A higher number of family members (any gender) increase non-farm income and total income; however, it may reduce farm income. In fact, the results showed that an increase in one male member reduced farm income by 4.4%—suggesting that in this community, male members mostly contribute to overall household income by non-farm work, possibly out-migration and self-employed traditional blacksmiths, resulting in male labour constraints in the farm activities (Jaquet et al., 2016, 2019). Nearly 20% of the Dalit households reported remittance income (see Table 3). The higher the number of elderly household members, the lower the income. Each additional elderly household member in a Dalit house reduced the total income by 7.2%, and non-farm income by 8%. Its effect on farm income was negative, but statistically insignificant at the 95% confidence level. The elderly are at high risk of illness, especially non-communicable diseases such as hypertension (Ghimire et al., 2019).

Diversification of income sources significantly increased household income, both farm and non-farm, and their sum. Dalit households who had access to multiple sources of income had higher incomes. Diversification of income sources as a livelihood strategy is the norm (Barrett et al., 2001; Evans & Ngau, 1991; Khatiwada et al., 2017; Lanjouw & Lanjouw, 2001; McNamara & Weiss, 2005), mainly driven by opportunities and risk aversion (Gautam & Andersen, 2016; Gentle et al., 2018; Khatiwada et al., 2018).

Finally, we also observed that a certain social and economic “status” had a positive correlation with household income, which is illustrated by higher household income (approximately 22%) in nearly half of the Dalit households that owned at least one television set. Prior studies suggest that the presence of household amenities such as television sets, especially in a poor household, often indicates a relatively well-off household (Sharma & Aryal, 2016; Sunam, 2014) compared to poor households that do not own a television set.

6 Implications of findings

The findings of this study raise several policy concerns. Agriculture is the main occupation of Dalit households (Table 2). However, per capita income from farms is substantially below that from non-farm sources (Table 4). In the current scenario, income from day labour and salaried jobs may have increased temporarily: a high demand for skilled and unskilled labour and the offer of jobs by local government and development partners immediately after the earthquake and in the post-recovery process may have resulted in an increase in earnings from such sources. For example, in 2016–2017, about 60,000 local people received skills training in the 14 most affected earthquake districts—mainly masonry, carpentry, electrics, plumbing, and social mobilization (Hada, 2018). At the survey time, reconstruction of nearly 72% of the houses in GRM had been fully completed, so it is likely that in the future, the demand for labour will decrease, resulting in a sharp decline in income from day labour and salaried jobs. Some households (20%) received
remittance income. As a livelihood enhancing strategy, out-migration overseas is common in Nepal. Remittances contributed 25% to the national GDP in 2017/2018, and approximately 30% immediately after the Gorkha earthquake (Ministry of Finance, 2018). Recent data (Ministry of Labour, 2020) show that its contribution to GDP has been decreasing because of higher national demand for labour. However, studies that look beyond purely financial aspects of migration come to different conclusions. These studies (Craven & Gartaula, 2015; Gartaula et al., 2010; Kim et al., 2019; Sunam, 2014; Sunam & McCarthy, 2016) raise several social and cultural issues such as migrant hardship (and even death) overseas, sexual infidelity, marital separation, and father abandonment—which are more serious in Nepal because of Hinduism’s influence and a traditionally patriarchal society (Sunam, 2014). Manandhar (2016) found an increased risk of earthquake damage in newly built houses of remittance-dependent households because of the unsafe construction practices they followed after the Gorkha earthquake. Likewise, Sato et al. (2022) observed that houses built through remittance income are more vulnerable to earthquakes because of minimal repair and maintenance as there is a shortage of working-age male family members. Finally, increasing dependency on remittances may show an inability of the country to provide people with sufficient and decent jobs at home (Guru, 2019), increase reliance on markets even for basic needs (Kim et al., 2019), and introduce unhealthy (non-traditional) foods (Thow et al., 2016). A high reliance on remittances may produce a high risk to the country’s economy in any kind of international labour market crisis. Empirical studies demonstrating a significant drop in the remittance influx and reduction in the share of remittances in the gross national domestic product in earlier crises (for example, global financial crisis, Maoist insurgency in Nepal) are available (Sapkota, 2013), and for the recent Coronavirus (COVID-19) crisis, studies are emerging (Adhikari et al., 2022; Bhattarai & Subedi, 2021).

We thus argue that non-farm income sources in our study site (particularly day labour, local jobs, and remittances) may be temporary and unsustainable, and we also see that agricultural income is at a low near-subsistence level and negatively correlating with household non-farm income. Studies suggest that non-farm income may provide a kind of insurance against the risks of farming and may enable poor households to adopt new production technology provided they have access to vibrant nearby markets (Bhandari & Ghimire, 2016; Evans & Ngau, 1991), which needs further investigation in our case. Strategies that only target agriculture to enhance the livelihoods of the poor have proved to be inadequate long ago, so it might be better to establish synergies between farm and non-farm opportunities for Dalits. A recent study conducted in Gorkha District also observed the lack of farmland and cash jobs (He, 2019). The main challenge, however, lies in strategically allocating non-farm income (for example, remittances) to the agriculture sector (for example, purchasing seeds, fertilizers, farm tools, and machinery) or other sustainable investments, especially in poor Dalit households, because increasing evidence (Dhakal & Maharjan, 2018; Sapkota, 2013) revealed other non-productive use of remittance income (for example, consumption of non-traditional junk food).

Government agencies, policymakers, Dalit rights activists, and those who are engaged in developing Dalit-led entrepreneurship and employment generation, especially the development partners working in post-disaster programmes, should consider that farming carries risks and a number of uncertainties, including weather and market conditions. For Dalits, the risk situation may be further exacerbated by their low level of personal capabilities and social/economic exclusion. We already stated that neither sharecropping nor farm animals increase overall household incomes, but their value for the lowest income quantile was significant. Thus, farm support for the lowest income households is essential.
to reduce severe food insecurity stresses so the beneficiaries can take advantage of non-farm livelihood enhancing opportunities (Hashemi & Montesquiou, 2011; Montesquiou et al., 2014). Also, farm support for women was found to increase indirect benefits, such as improved nutritional status of children (Cunningham et al., 2015). In such circumstances, a multidimensional critical push over a limited time period (Barrett et al., 2016; Halder & Mosley, 2004) may be required for the lower income third of the Dalit population. The implementation of multidimensional and integrated interventions has already shown positive impacts on income, food security, health knowledge, and behaviours of the poor in Bangladesh (Ahmed, 2009). Such programmes not only achieve measurable impact but benefits may also be more long-term (Banerjee et al., 2015). Integration of credit and insurance programmes, safety net programmes, social protection schemes, child sponsorship schemes, and changing the systems that perpetuate discrimination, as well as immediate consumption support, skills training, and microfinance have been suggested (Ahmed, 2009; Barrett et al., 2016; Halder & Mosley, 2004; Hashemi & Montesquiou, 2011; Matin & Hulme, 2003; Montesquiou et al., 2014). The government of Nepal has several social protection provisions for Dalit households, single women, the elderly, and other vulnerable groups (for example, PwDs) (ILO, 2017); however, support is nominal and does not always reach the most destitute. Future project interventions for Dalits may need to integrate multiple components—rather than small, subsistence-based, and fragmented interventions—to enhance economic empowerment.

We observed a sharp increase in per capita income for the highest 10% quantile households (see Fig. 4)—a detailed analysis of the “political economy” of income inequality and “elite capture” within the Dalit caste group may provide useful information. Instead of development partners reaching many beneficiaries at scale through a “technology transfer mindset”, we suggest they recognize the complexities involved in the transition process and change the mindset towards processes aimed at “sustainable system development” (Woltering et al., 2019). Such projects for the poor should be flexible, and priority should be given to livelihood protection mechanisms (provision of small grants and emergency loans) throughout the project cycle; this is, in particular, because the income increase of poor people may not be linear (see Fig. 1). U-turns are possible (Matin & Hulme, 2003).

Besides acute poverty, caste-based discrimination is an additional issue for Dalits’ well-being. Caste-based discrimination, perpetuated by prejudiced mindsets of “upper-castes”, contributes to maintaining the gaps between these groups despite social and ideological development. There are plenty of examples that even elected Dalit representatives and elite Dalits in cities face social discrimination (Pariyar & Lovett, 2016). This study observed that not necessarily all Dalits are poor, and thus, an understanding of intra-Dalit economic status may be necessary for development practitioners. Because of poverty and discrimination, their access to resources and participation may have been severely restricted. For example, historical representation of Dalits in the legislature 1959–2013 is approximately 4.2% (Pandeya & Oyama, 2019). However, in the 2017 inclusive and proportional local level election, their political participation in the 753 local legislatures was said to increase up to 22%; this, however, is due to the constitutional quota of inclusion of Dalit women as members in the Ward representatives (the lowest administrative unit). Without the quota for Dalit women, for example, the percentage of representation is reduced to just 3.3% (Paswan, 2017); so underrepresentation of Dalits in local and higher-level legislatures persists.

Further, it is important to establish new or to strengthen existing Dalit networks for leadership to fight for their constitutional rights, advocate against discrimination and deprivation, and share information and knowledge about Dalits. Advocacy is needed not only to empower local people but also to transform the mindsets of politicians, policymakers,
religious leaders, and community members. It is vital to have constitutional provisions, national/provincial/federal policies, plans and programmes in favour of equality to eliminate discrimination; however, honest implementation of these legal provisions is challenging (Panthee, 2020) because changing the mindsets of society and people who continue to internalize prejudice and practice discrimination in daily life is extremely difficult without good governance at local to national levels in all aspects of the political, legal, and humanitarian sectors. Reducing income poverty alone may not address the ongoing issues of social exclusion and untouchability. It is the responsibility of the state, political parties, legislative bodies, judiciary bodies, and also other members of society including “upper-castes” and development practitioners to provide equal opportunities for both Dalits and non-Dalits by changing their behaviours, attitudes, and prejudices towards centuries-long caste-based discrimination (UNDP, 2008). Caste-based discrimination is a deeply rooted and ongoing social problem, and is also a feature of modern labour markets and economy (Mosse, 2018), and thus will not simply disappear. Therefore, long-term strategies need to be developed. In the long run, changing the existing education systems are necessary through redefining caste structures in new curricula. Courses on structuring a culture of human rights and entitlements should start from the early years of schooling so that mindsets that promote discrimination and exclusion can be transformed in the early stages of life. Introducing transformative learning in school education systems (Leal Filho et al., 2018) could empower the self-realization of human potential and critical thinking to develop a sustainable society free of caste-based discrimination and inequality.

We found Dalits highly depend on day labour and remittances for their livelihoods, and these sources of income are extremely volatile in changing climates, increasing disasters, and health pandemics. Income inequality among Dalits is increasing, and the highest quantile households (the elite Dalits) may have been benefiting the most from legal provisions and quotas; thus, further studies on income inequality and chronic poverty are needed for a deeper understanding of the distributional effect of disasters’ impact on household resilience. This study may contribute to the debate in the policy arena on disaggregating Dalits according to income quantiles and planning policies and social protection provisions based on either income quantiles or the poverty index, rather than just categorization as “Dalit”. One note is that the ongoing DFID-funded “Purnima Programme” has designed tailor-made farm and non-farm interventions to increase the incomes of the most vulnerable groups, including poor Dalits in the study area (over 400 Dalit households) following the preliminary findings of the Census report and our study. The most notable interventions designed and implemented for Dalit households are provided in Table 10. Those interventions can be categorized into three types: restorational, protectional, promotional—this is what we illustrated in Fig. 1. Livelihood protection/promotion interventions for the long-term post-disaster recovery plan need a detailed vulnerability assessment to have a greater effect. We therefore suggest an additional study to gain a clearer picture of the real-life impact of the interventions provided.

Finally, a few limitations of this study should be noted. Income was self-reported and documented by several enumerators. Some survey respondents may have been reluctant to reveal their income sources and respective income. In this study, we were unable to explore qualitative information to explain the data. Further, the correlation results among the various categories of income sources by quantiles have to be interpreted with caution because of the small sample size. Nonetheless, the survey was done with a carefully designed questionnaire with close coordination between the project donor (DFID), manager (Mott MacDonald), local government (GRM), and implementing partner (PHASE Nepal). In fact, data collection was done for a dual purpose. The first was to collect baseline income
Table 10 Various types of post-earthquake recovery and reconstruction interventions implemented for Dalit households in the study area

| Intervention area | Interventions | Only if dalit PwD |
|-------------------|---------------|------------------|
| Restoration       | Rebuilding of houses devastated in earthquake with material and labour support | – |
| Protectional      | Facilitation in documentation and authorization of individual social security identity cards; facilitation in accessing social security allowances and related social safety schemes; off-season vegetable farming; dual purpose poultry chicks; sewing machines for tailoring business, and improved tools and equipment (hammer, air blower, blacksmith tongs, grinder with cutting blade) support for blacksmith workshop operation | Assistive devices (wheel chair, toilet chair, arm stick, bed sore ring); housing modification (ramp and hand rail construction) for mobility assistance |
| Promotional       | Capacitated with soft and life skills, enhanced knowledge on rights, policies, and plans the government provides for disadvantaged groups; facilitation of access to government services (prioritized services in health post, discount in local transportation, and educational services); technical backstopping to adopt improved farming practices and technologies (tunnel farming, mulching, drip and pond irrigation); linked with local vegetable collection centre and agriculture cooperatives, village animal health worker; increase access to finance and government schemes; skills for face mask sewing; blacksmith workshop for promoting traditionally valued tools (knife, sickle, sword) and marketing; vocational training (mobile repair, carpentry, plumbing, village animal health worker, seed, and pesticide retailer) | In coordination with local government, day celebration and appreciation programmes for PwD |
information to plan interventions to address vulnerabilities in the study population, and the second was to build a foundation for the municipality’s long-term planning process.

7 Conclusions and recommendations

The paper explores how Dalits in Nepal suffer from income deprivation by taking into consideration the Dalit households’ income sources and income determinants in Gandaki Rural Municipality in Gorkha District. The study showed that day labour, livestock sales, pensions/social security, and vegetable sales are the primary sources of income for most Dalit households. Higher-income Dalit households also received remittances and income from salaried jobs, which together made up a larger total amount. Annual per capita income from farm sources (US$46) was considerably less than non-farm sources (US$273). This gap was lowest in the lowest quantile and highest in the highest quantile. We showed that the presence of a vulnerable individual within Dalit households reduces income. If the household head was a single woman, total household income was reduced by 23% and non-farm income by 29%. When the household head was suffering from chronic illness, income was reduced by nearly 9%. Also, each additional elderly household member correlated with a reduction of total household income by 7.2%, and non-farm income by 8%. We argue that remittance income and income from salaried jobs may decline sharply in the study area as the wider economic conditions change, thus interventions that synergize farm and non-farm opportunities are needed for Dalits.

An increasing share of non-farm income to total income as we move from poor to non-poor shows limited opportunities for increasing farm income in the area and a higher departure of non-poor rural Dalit households from farm activities—while for poor Dalits, farming is still an important source of income. A blanket approach of support may not work in the post-earthquake development process, especially for vulnerable individuals. Interventions facilitating synergies between farm and non-farm sectors, with special attention to vulnerable individuals, are suggested for enhanced economic benefit. More studies on income inequality within the Dalit community may be necessary to better understand the distributional effects of environmental shocks and disasters on household resilience. We suggest that farm-level support for the poorest of the poor is essential in order to reduce severe food insecurity stresses and to increase participation in non-farm livelihood-enhancing opportunities. Finally, we encourage development partners working for these people to change their mindsets from “technology transfer” to processes aimed at sustainable system development. Considering this complexity, we suggest providing technical skills and vocational training for Dalits—especially by better targeting and considering (1) individual skills, (2) economic opportunities; and more attention to (3) initial start-up cash support for new skills-based enterprises, and (4) self-employability. In addition, there may be a need for a new national-level policy for Dalit inclusion in relation to the modern economy, reframing the Dalit beyond political “reservation” and “quotas” of affirmative action. Policymakers and scholars may need to consider the reasons the study found for increasing income inequality among Dalit households. Besides policies for Dalits per se, giving caste its own unique place in the development agenda, there is also a need to address market and non-market discrimination. Note that the direction and strength of the relationship between farm and non-farm income of the poor are uncertain, localized, and volatile—contingent upon household endowments and their capabilities—and thus future studies could apply a
political economy angle in order to understand household income dynamics in relation to place, origin, and change.

Acknowledgements The views and opinions presented here are those of the authors and do not reflect the views of support agencies and collaborators. The lead author was an employee of PHASE Nepal at the time of data collection. However, now he works for Tribhuvan University. All authors are grateful to Gandaki Rural Municipality, the UK Department of International Development (DFID), and Mott MacDonald for their logistical, financial, and managerial support, respectively. We appreciate the support from the PHASE Nepal staff positioned in the field and head office. A special appreciation goes to Anjan Pokharel and Ganga Adhikari for their continuous hard work during the Census and data validation process. We highly appreciate the comments and suggestions from the anonymous reviewers. A special thanks to Brita Pohl for the English language proofreading. Finally, we thank the enumerators and the people of Gandaki Rural Municipality, and we dedicate this article to those who lost their lives in the Gorkha Earthquake.

Data availability Unavailable because of the collaborative development project funded by international agency.

Declarations

Conflict of interest Authors declare no conflict of interests.

References

ACAPS. (2015). Lessons learned for Nepal earthquake response. https://www.alnap.org/system/files/content/resource/files/main/l-acaps-lessons-learned-nepal-earthquake-27-april-2015.pdf. Accessed 7 August, 2019

Adhikari, J., Bruslé, T., Subedi, M., Rai, M., & Baral, C. (2022). COVID-19’s impact on Nepalese migrants: families. Vulnerability, coping strategies, and the role of state and non-state actors. Critical Asian Studies. https://doi.org/10.1080/14672715.2022.2076707

Ahmed, S. M. (2009). Capability Development among the Ultra-poor in Bangladesh: A case study. Journal of Health Population and Nutrition, 27(4), 528–535.

Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., et al. (2015). A multifaceted program causes lasting progress for the very poor: Evidence from six countries. Science. https://doi.org/10.1126/science.1260799

Bankoff, G., Frerks, G., & Hilhorst, D. (2013). Mapping vulnerability: Disasters, development and people. In G. Bankoff, G. Frerks, & D. Hilhorst (Eds.), Mapping vulnerability: Disasters, development and people (pp. 1–236). Earthscan.

Barrett, C., Garg, T., & McBride, L. (2016). Well-being dynamics and poverty traps. Annual Review of Resource Economics, 8(1), 303–327. https://doi.org/10.1146/annurev-resource-100815-095235

Barrett, C., Reardon, T., & Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. Food Policy, 26(4), 315–331. https://doi.org/10.1016/S0306-9192(01)00014-8

Bhandari, P., & Ghimire, D. (2016). Rural agricultural change and individual out-migration. Rural Sociology, 81(4), 572–600. https://doi.org/10.1111/ruso.12106

Bhattarai, G., & Subedi, B. (2021). Impact of COVID-19 on FDIs, remittances and foreign aids: A case study of Nepal. Millennial Asia, 12(2), 145–161. https://doi.org/10.1076/millaje.07882900620974202

Bhandari, G. P., Angdembe, M. R., Dhimal, M., Neupane, S., & Bhusal, C. (2014). State of non-communicable diseases in Nepal. BMC Public Health, 14(1), 23. https://doi.org/10.1186/1471-2458-14-23

Bishwakarma, M. (2017). Democratic politics in Nepal: Dalit political inequality and representation. Asian Journal of Comparative Politics, 2(3), 261–272. https://doi.org/10.1177/2057891116660633

Bishwakarma, M. (2018). Political transformations in Nepal: Dalit inequality and justice. The University of Sydney, Australia. Retrieved from https://ses.library.usyd.edu.au/bitstream/2123/17882/1/bishwakarma_mb_thesis.pdf

Chaulagain, Gautam, D., & Rodrigues, H. (2018). Revisiting major historical earthquakes in Nepal: Overview of 1833, 1934, 1980, 1988, 2011, and 2015 seismic events. In Impacts and insights of the Gorkha earthquake (pp. 1–17). Elsevier. https://doi.org/10.1016/B978-0-12-812808-4.00001-8
Chaurasiya, S. P., Pravana, N. K., Khanal, V., & Giri, D. (2019). Two thirds of the most disadvantaged Dalit population of Nepal still do not deliver in health facilities despite impressive success in maternal health. *PLOS ONE, 14*(6), 1–14. https://doi.org/10.1371/journal.pone.0217337

Craven, L. K., & Gartaula, H. N. (2015). Conceptualising the migration-food security nexus: Lessons from Nepal and Vanuatu. *Australian Geographer, 46*(4), 455–471. https://doi.org/10.1080/00049182.2015.1058797

Cunningham, K., Plouibidis, G. B., Menon, P., Ruel, M., Kadiyala, S., Uauy, R., & Ferguson, E. (2015). Women’s empowerment in agriculture and child nutritional status in rural Nepal. *Public Health Nutrition, 18*(17), 3134–3145. https://doi.org/10.1017/S1368980015000683

Devkota, H. R., Clarke, A., Murray, E., & Groce, N. (2017). Do experiences and perceptions about quality of care differ among social groups in Nepal?: A study of maternal healthcare experiences of women with and without disabilities, and Dalit and non-Dalit women. *PLOS ONE, 12*(12), e0188554. https://doi.org/10.1371/journal.pone.0188554

Dhakal, N. H., & Maharjan, A. (2018). Approaches to the productive uses of remittances in Nepal (No. 2018/1). Kathmandu, Nepal. http://lib.icimod.org/record/33734/files/icimod569_WP1-018.pdf

DiCarlo, J., Epstein, K., Marsh, R., & Mären, I. (2018). Post-disaster agricultural transitions in Nepal. *Ambio, 47*(7), 794–805. https://doi.org/10.1007/s13280-018-1021-3

Elliott, J. R., Jolivet, R., González, P. J., Avouac, J.-P., Hollingsworth, J., Searle, M. P., & Stevens, V. L. (2016). Himalayan megathrust geometry and relation to topography revealed by the Gorkha earthquake. *Nature Geoscience, 9*(2), 174–180. https://doi.org/10.1038/ngeo2623

Evans, H. E., & Ngau, P. (1991). Rural-Urban relations, household income diversification and agricultural productivity. *Development and Change, 22*(3), 519–545. https://doi.org/10.1111/j.1467-7660.1991.tb00424.x

FAO. (2011). *Guidelines for the preparation of livestock sector reviews*. Food and Agriculture Organization of the United Nations.

Ford, C. (2018). Interpreting log transformations in a linear model. *University of Virginia Library*. https://data.library.virginia.edu/interpreting-log-transformations-in-a-linear-model/. Accessed 4 June, 2022

Gartaula, H. N., Niehof, A., & Visser, L. (2010). Feminisation of agriculture as an effect of male out-migration: Unexpected outcomes from Jhapa district, eastern Nepal. *International Journal of Interdisciplinary Social Sciences, 5*(2), 565–577. https://doi.org/10.18848/1383-1882/CGP/v05i02/51588

Gautam, Y., & Andersen, P. (2016). Rural livelihood diversification and household well-being: Insights from Humla, Nepal. *Journal of Rural Studies, 44*, 239–249. https://doi.org/10.1016/j.jrurstud.2016.02.001

Gautam, Y., & Andersen, P. (2017). Multiple stressors, food system vulnerability and food insecurity in Humla, Nepal. *Regional Environmental Change, 17*(5), 1493–1504. https://doi.org/10.1007/s10113-017-1110-z

Gentle, P., Thwaites, R., Race, D., Alexander, K., & Maraseni, T. (2018). Household and community responses to impacts of climate change in the rural hills of Nepal. *Climatic Change, 147*(1–2), 267–282. https://doi.org/10.1007/s10584-017-2124-8

Ghimire, S., Mishra, S. R., Baral, B. K., Dhimal, M., Callahan, K. E., Bista, B., & Aryal, K. K. (2019). Noncommunicable disease risk factors among older adults aged 60–69 years in Nepal: Findings from the STEPS survey 2013. *Journal of Human Hypertension, 33*(8), 602–612. https://doi.org/10.1038/s41371-019-0161-7

Grant, U. (2005). *Health and poverty linkages: Perspectives of the chronically poor*. London: Chronic Poverty Research Centre. https://doi.org/10.2139/ssrn.1755083

Gupta, I., & Chowdhury, S. (2014). Correlates of out-of-pocket spending on health in Nepal: Implications for policy. *WHO South-East Asia Journal of Public Health, 3*(3), 258. https://doi.org/10.4103/2224-3151.206746

Guru, G. (2019). Migration: A moral protest. *Social Change, 49*(2), 315–328. https://doi.org/10.1177/0049085719844108

Gurung, A., Bista, R., Karki, R., Shrestha, S., Uprety, D., & Oh, S. E. (2013). Community-based forest management and its role in improving forest conditions in Nepal. *Small-Scale Forestry, 12*(3), 377–388. https://doi.org/10.1007/s11842-012-9217-z

Hada, M. (2018). *Post-earthquake occupation skills demand assessment report*. Kathmandu, Nepal. https://www.dakchyata-nepal.org/sites/default/files/PostEarthquake_Occupation_Skills_Demand_Assessment_Report_1.pdf. Accessed 10 August, 2019

Halder, S. R., & Mosley, P. (2004). Working with the ultra-poor: Learning from BRAC experiences. *Journal of International Development, 16*(3), 387–406. https://doi.org/10.1002/jid.1084

Hallegatte, S., Vogt-Schilb, A., Rozenberg, J., Bangalore, M., & Beaudet, C. (2020). From poverty to disaster and back: A review of the literature. *Economics of Disasters and Climate Change*. https://doi.org/10.1007/s41885-020-00060-5

K. Atreya et al.
Hashemi, S. M., & Montesquieu, A. (2011). Reaching the poorest: Lessons from the graduation model. Focus Note, 69, 1–16.

He, L. (2019). Identifying local needs for post-disaster recovery in Nepal. World Development, 118, 52–62. https://doi.org/10.1016/j.worlddev.2019.02.005

ILO. (2005). Dalits and labour in Nepal: Descrimination and forced labour. International Labour Office.

ILO. (2017). An analytical briefing on the social security sector in Nepal. ILO Country Office for Nepal. International Dalit Solidarity Network. (2018). Briefing Paper for the ICERD Committee Members. https://idsn.org/wp-content/uploads/2018/07/CERD-briefing-paper-NEPAL-review-April-2018-.pdf. Accessed 8 August, 2019

Jaggi, A., & Müller-Böker, U. (2019). Affirmative action to target Dalits: Practices of Swiss development agencies in Nepal. European Bulletin of Himalayan Research, 53, 5–34.

Jaquet, S., Kohler, T., & Schwilch, G. (2019). Labour migration in the middle hills of Nepal: Consequences on land management strategies. Sustainability (switzerland), 11(5), 1–19. https://doi.org/10.3390/su11051349

Jaquet, S., Shrestha, G., Kohler, T., & Schwilch, G. (2016). The effects of migration on livelihoods, land management, and vulnerability to natural disasters in the Harpan Watershed in Western Nepal. Mountain Research and Development, 36(4), 494–505. https://doi.org/10.1659/mrd-journald-16-00034.1

Kabir, N. (2000). Social exclusion, poverty and discrimination: Towards an analytical framework. IDS Bulletin, 31(4), 83–97. https://doi.org/10.1111/i.1759-5436.2000.mp31004009.x

Kabin, A., Maitrot, M. R. L., Ali, A., Farhana, N., & Criel, B. (2018). Qualitative exploration of socio-cultural determinants of health inequities of Dalit population in Dhaka City, Bangladesh. British Medical Journal Open, 8(12), 1–13. https://doi.org/10.1136/bmjopen-2018-022906

Kanel, T. K. (2018). What are the impacts of the child grant policy in Nepal on Dalit women? A qualitative analysis. Gender, Technology and Development, 22(3), 246–265. https://doi.org/10.1080/09718524.2018.1546032

Kargel, J. S., Leonard, G. J., Shugar, D. H., Haritashya, U. K., Bevington, A., Fielding, E. J., et al. (2016). Geomorphic and geologic controls of geohazards induced by Nepal’s 2015 Gorkha earthquake. Science (new York, NY), 351(6269), aac8353. https://doi.org/10.1126/science.aac8353

Karki, M., & Bohara, A. K. (2014). Evidence of earnings inequality based on caste in Nepal. Developing Economies, 52(3), 262–286. https://doi.org/10.1111/deve.12049

Khanal, S. (2019). Food security status and coping strategies: A case study of Dalits community in Lamjung, District. Nepal. World News of Natural Sciences, 23, 69–74.

Khatiwada, S. P., Deng, W., Paudel, B., Khatiwada, J. R., Zhang, J., & Su, Y. (2017). Household livelihood strategies and implication for poverty reduction in rural areas of central Nepal. Sustainability (switzerland), 9(4), 612. https://doi.org/10.3390/su9040612

Khatiwada, S. P., Deng, W., Paudel, B., Khatiwada, J. R., Zhang, J., & Wan, J. (2018). A gender analysis of changing livelihood activities in the rural areas of central Nepal. Sustainability (switzerland), 10(11), 1–24. https://doi.org/10.3390/su10114034

Kim, J. J., Stites, E., Webb, P., Constanza, M. A., & Maxwell, D. (2019). The effects of male out-migration on household food security in rural Nepal. Food Security, 11(3), 719–732. https://doi.org/10.1007/s12571-019-00919-w

Kohrt, B. A., Hruschka, D. J., Worthman, C. M., Kunz, R. D., Baldwin, J. L., Upadhyaya, N., et al. (2012). Political violence and mental health in Nepal: Prospective study. British Journal of Psychiatry, 201(4), 268–275. https://doi.org/10.1192/bjp.bp.111.096222

Lam, M. L., & Kuipers, R. (2019). Resilience and disaster governance: Some insights from the 2015 Nepal earthquake. International Journal of Disaster Risk Reduction, 33(November 2018), 321–331. https://doi.org/10.1016/j.ijdrr.2018.10.017

Lam, L., Pant, B., & Sarma, V. (2019). The Political economy of Caste, Forced displacement and impact on local communities’ welfare in Nepal. In N. Yoshino & S. Paul (Eds.), Land acquisition in Asia: Towards a sustainable policy framework (pp. 1–184). Palgrave Macmillan Singapore. https://doi.org/10.1007/978-981-13-6455-6

Lanjouw, J. O., & Lanjouw, P. (2001). The rural non-farm sector: Issues and evidence from developing countries. Agricultural Economics, 26(1), 1–23. https://doi.org/10.1016/S0169-5150(00)00104-3

Leal Filho, W., Raath, S., Lazzarini, B., Vargas, V. R., de Souza, L., Anholon, R., et al. (2018). The role of transformation in learning and education for sustainability. Journal of Cleaner Production, 199, 286–295. https://doi.org/10.1016/j.jclepro.2018.07.017

Maltosgliou, I., & Taniguchi, K. (2004). Poverty, livestock and household typologies in Nepal. Working Papers. https://doi.org/10.22004/ag.econ.23808
Manandhar, B. (2016). Remittance and earthquake preparedness. International Journal of Disaster Risk Reduction, 15, 52–60. https://doi.org/10.1016/j.ijdrr.2015.12.003

Matin, I., & Hulme, D. (2003). Programs for the poorest: Learning from the IGVGD program in Bangladesh. World Development, 31(3), 647–665. https://doi.org/10.1016/S0305-750X(02)00223-1

McIntyre, D., Thiede, M., Dahlgren, G., & Whitehead, M. (2006). What are the economic consequences for households of illness and of paying for health care in low- and middle-income country contexts? Social Science and Medicine, 62(4), 858–865. https://doi.org/10.1016/j.socscimed.2005.07.001

McKay, A., & Lawson, D. (2003). Assessing the extent and nature of chronic poverty in low income countries: Issues and evidence. World Development, 31(3), 425–439. https://doi.org/10.1016/S0305-750X(02)00221-8

McNamara, K. T., & Weiss, C. (2005). Farm household income and on- and off-farm diversification. Journal of Agricultural and Applied Economics, 37(1), 37–48. https://doi.org/10.1017/s107407080007082

Mencin, D., Bendick, R., Upreti, B. N., Adhikari, D. P., Gajurel, A. P., Bhattarai, R. R., et al. (2016). Himalayan strain reservoir inferred from limited afterslip following the Gorkha earthquake. Nature Geoscience, 9(7), 533–537. https://doi.org/10.1038/ngeo2734

Ministry of Finance. (2018). Economic Survey 2017/2018. Government of Nepal.

Ministry of Labour, E. & S. S. (2020). Nepal Labour Migration Report 2020. Ministry of Labour, Employment and Social Security/Government of Nepal.

Mitchell, R. J., & Bates, P. (2011). Measuring health-related productivity loss. Population Health Management, 14(2), 93–98. https://doi.org/10.1089/pop.2010.0014

Montesquito, A. D., Sheldon, T., Degiovanni, F., & Hashemi, S. M. (2014). From extreme poverty to sustainable livelihoods: A technical guide to the graduation approach. http://www.cgap.org/sites/default/files/graduation_guide_final.pdf

Mosse, D. (2018). Caste and development: Contemporary perspectives on a structure of discrimination and advantage. World Development, 110, 422–436. https://doi.org/10.1016/j.worlddev.2018.06.003

Nepali, G. (2018). Discrimination on Dalit in Karnali and its Impact to Sustainable Development. Research Nepal Journal of Development Studies, 1(2), 84–95. https://doi.org/10.3126/rnjds.v1i2.22428

Pandeya, G. P., & Oyama, T. (2019). The question of equal representation of citizens in the legislature of Nepal: Rhetoric and reality. Asian Journal of Political Science, 27(1), 45–69. https://doi.org/10.1080/02185377.2019.1570471

Panthee, S. K. (2020). Effects of Maoist’s War on Dalits’ movement. Contemporary Voice of Dalit. https://doi.org/10.1177/2455328x20922442

Pariyar, B., & Lovett, J. C. (2016). Dalit identity in urban Pokhara, Nepal. Geoforum, 75, 134–147. https://doi.org/10.1016/j.geoforum.2016.07.006

Paswan, B. (2017). How quotas provided a footing but left inequality unresolved: Dalits in the local election. The Record. https://www.recordnepal.com/wire/features/how-quotas-provided-a-foothing-but-left-inequality-unresolved-dalits-in-the-local-election/. Accessed 6 August, 2020

Paudel, J., & Ryu, H. (2018). Natural disasters and human capital: The case of Nepal’s earthquake. World Development, 111, 1–12. https://doi.org/10.1016/j.worlddev.2018.06.019

Platteau, J. P. (2004). Monitoring elite capture in community-driven development. Development and Change, 35(2), 223–246. https://doi.org/10.1111/j.1467-7660.2004.00350.x

Renahy, E., Alvarado-Llano, B., Koh, M., & Quesnel-Vallée, A. (2012). Income and economic exclusion: Do they measure the same concept? International Journal for Equity in Health, 11(1), 4. https://doi.org/10.1186/1475-9276-11-4

Saito, T., Tachibana, T., Sakurai, T., & Rayamajahi, S. (2022). Do remittances make poor households more resistant to ‘natural disasters’? Evidence from the 2015 earthquake in Nepal. International Journal of Disaster Risk Reduction, 73, 102858. https://doi.org/10.1016/j.ijdrr.2022.102858

Schilderman, T., & Lyons, M. (2011). Resilient dwellings or resilient people? Towards people-centred reconstruction. Environmental Hazards, 10(3), 218–231. https://doi.org/10.1080/17477891.2011.598497
Shahi, S. (2018). Understanding Vikas: How Dalits make sense of development in rural Nepal. *Nepalese Journal of Development and Rural Studies, 14*(1–2), 98–111. https://doi.org/10.3126/njdrs.v14i1-2.19653

Shanmugavelan, M. (2019). Caste discrimination is blocking progress on the SDGs. https://www.bond.org.uk/news/2019/03/caste-discrimination-is-blocking-progress-on-the-sdgs. Accessed 9 August, 2019

Sharma-Gautam, D., & Hearn, G. (2019). No time, no money, no luck: Barriers to prenatal care among dalit women in rural Nepal. *Health Care for Women International, 40*(7–9), 914–930. https://doi.org/10.1080/07399332.2019.1597366

Sharma, G., & Aryal, B. (2016). Household economies of Chepang people in Chitwan. *Economic Literature, 13*, 39–45. https://doi.org/10.3126/el.v13i0.19149

Singh, A., & Singh, S. (2008). Diseases of poverty and lifestyle, well-being and human development. *Mens Sana Monographs, 6*(1), 187–225. https://doi.org/10.4103/0973-1229.40567

Sunam, R. (2014). Marginalised Dalits in international labour migration: Reconfiguring economic and social relations in Nepal. *Journal of Ethnic and Migration Studies, 40*(12), 2030–2048. https://doi.org/10.1080/1369183X.2014.948393

Sunam, R. K., & McCarthy, J. F. (2016). Reconsidering the links between poverty, international labour migration, and agrarian change: Critical insights from Nepal. *Journal of Peasant Studies, 43*(1), 39–63. https://doi.org/10.1080/03066150.2015.1041520

Thapa, N. B. (2020). Assessment of recovery and resilience livelihoods after earthquake in Gorkha District, Gandaki Province, Nepal. *Lowland Technology International, 21*(4), 237–245.

Thorat, S., & Madheswaran, S. (2018). Graded caste inequality and poverty: Evidence on role of economic discrimination. *Journal of Social Inclusion Studies, 4*(1), 3–29. https://doi.org/10.1177/2394481118775873

Thow, A. M., Fanzo, J., & Negin, J. (2016). A systematic review of the effect of remittances on diet and nutrition. *Food and Nutrition Bulletin, 37*(1), 42–64. https://doi.org/10.1177/0379572116631651

UNDP. (2008). *The Dalits of Nepal and a new constitution*. United NAtions Development Programme. https://idsn.org/uploads/media/DalitsOfNepalAndTheNewConstitution.pdf

Upreti, B. C. (2010). Dalits in Nepal. *Contemporary Voice of Dalit, 3*(1), 1–10. https://doi.org/10.1177/09743545201000101

Vishwakarma, H. (2002). The Dalits of Nepal and their struggles for social justice. *Development (basing-stoke), 45*(3), 90–92. https://doi.org/10.1057/palgrave.development.1110386

Wagle, U. (2005). Multidimensional poverty measurement with economic well-being, capability, and social inclusion: A case from Kathmandu, Nepal. *Journal of Human Development, 6*(3), 301–328. https://doi.org/10.1080/14649880500287621

Woltering, L., Fehlenberg, K., Gerard, B., Ubels, J., & Cooley, L. (2019). Scaling—from “reaching many” to sustainable systems change at scale: A critical shift in mindset. *Agricultural Systems*. https://doi.org/10.1016/j.agsy.2019.102652

Yang, H., Dietz, T., Yang, W., Zhang, J., & Liu, J. (2018). Changes in human well-being and rural livelihoods under natural disasters. *Ecological Economics, 151*(May), 184–194. https://doi.org/10.1016/j.ecolecon.2018.05.008

Yaro, J. A. (2002). The poor peasant: One label, different lives. The dynamics of rural livelihood strategies in the Gia-Kajelo community, Northern Ghana. *Norsk Geografisk Tidsskrift, 56*(1), 10–20. https://doi.org/10.1080/002919502317325731

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.