

**Research Article:****THE AGRARIAN PARADOX: AN IMPACT OF FOREIGN LABOUR MIGRATION AND REMITTANCES ON AGRICULTURAL ACTIVITIES IN MAHOTTARI, NEPAL****Krishna Prasad Thapaliya<sup>a\*</sup>, Kiran Acharya<sup>a</sup>, Sunil Chaudhary<sup>b</sup>, Rajan Nepali<sup>a</sup> and Sangita Poudel<sup>a</sup>**<sup>a</sup>Department of Rural Sociology and Development Studies, Faculty of Agriculture, Agriculture and Forestry University, Rampur, Chitwan, Nepal<sup>b</sup>College of Natural Resource Management, Agriculture and Forestry University, Bardibas, Mahottari, Nepal\*Corresponding author: [kpthapaliya@afu.edu.np](mailto:kpthapaliya@afu.edu.np)DOI: <https://doi.org/10.3126/jafu.v7i1.95427>

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**ABSTRACT**

Foreign labour migration has emerged as a significant socioeconomic phenomenon in Nepal, contributing substantially to the national economy through remittance inflows while also causing labour shortage and serious challenges for the sustainability and productivity of the agricultural sector. This study investigates the effects of foreign labour migration and remittances on agricultural activities in Bardibas Municipality. Using a mixed-methods approach, data were collected from migrant household heads and key informants. For quantitative data, respondents were selected using simple random sampling, whereas qualitative respondents were selected purposively. Quantitative data were analyzed in SPSS, and qualitative data were transcribed, thematically categorized, interpreted, and integrated with the quantitative findings. In 2024, the study found that labour migration is driven by both unemployment and socio-psychological motivations, such as the pursuit of social prestige, and that 88% of migrants prefer to migrate to GCC (Gulf Cooperation Council) nations. Although 88.3% of migrant households send remittances home through formal banking channels, these remittances have contributed to the “Lost Labour Effect.” Consequently, the agricultural sector is experiencing women’s empowerment through the “Feminization of Agriculture and Workload Pressure.” Female workload pressure refers to the increased labour burden on women, particularly in preparing inputs. On the positive side, remittance receipts have enabled the adoption of hybrid seeds (90.6%) and irrigation systems (93.8%) by overcoming liquidity constraints. More than three-fourths of returned migrants were engaged in subsistence farming, suggesting a limited reintegration effect. Overall, the findings indicate that remittances primarily function as a form of economic security or insurance for households. However, these remittances have yet to contribute to structural transformation through capital formation in the agricultural sector, thereby ensuring enhanced growth and development in rural Nepal.

**Keywords:** Feminization, labour shortage, livelihood, reintegration, remittance**INTRODUCTION**

Migration can be understood as a socio-economic and demographic process shaped by temporal, spatial, population, and individual characteristics. It is a universal phenomenon driven by a range of push and pull factors, including civil conflict, the pursuit of improved economic opportunities, family reunification, and environmental degradation (Sharma, 2008). In the context of Nepal, migration has evolved from a historical practice of military recruitment to

a contemporary livelihood strategy. Increasingly, rural youth seek employment in alternative destinations due to limited off-farm opportunities and declining interest in agriculture (Agasty & Patra, 2013). This shift is largely attributed to unemployment, poverty, inequality, social pressures, and political instability (Kollmair et al., 2006).

As per the information provided by the Ministry of Labour, Employment, and Social Security in 2025, Nepali labour migrants have secured work permits in 151 different countries worldwide. The pinnacle of this trend occurred in the fiscal year 2013/14 when the number of labour permits issued reached its zenith at 519,638. Subsequently, in the following years, there was a continuous decline in the number of permits granted. However, the outbreak of the COVID-19 pandemic and the subsequent imposition of travel restrictions had a substantial impact on these figures. In 2020/21, a mere 72,081 labour permits were issued, but there was a notable recovery in 2021/22, 2022/23, 2023/24, and 2024/25, with the number of permits granted reaching 348,867, 494,224, 460,102, and 505,957, respectively (DoFE, 2017; DoFE, 2025; MoLESS, 2022; NRB, 2025).

Remittances, defined as financial transfers sent by migrants to their places of origin, constitute a significant component of developing economies (de Haas, 2007). In 2015, global remittance flows to individuals were estimated at approximately 601 billion US dollars, a substantial proportion of which was directed to developing countries (World Bank, 2016). Nepal is often characterized as a “remittance economy,” with remittance inflows accounting for 24.1% of GDP in 2023 (MoF, 2024). Moreover, a report published by the World Bank (2024) stated that Nepal had a 25.4% share of remittances in its GDP composition (World Bank, 2025). While remittances have contributed to poverty reduction, they have also been associated with rising inequality and economic dependency (CBS, 2021; Devkota, 2014).

The migration of economically active household members for foreign employment has profound implications for the families left behind, typically comprising women, children, and the elderly. Such separation reshapes household dynamics by increasing the workload of remaining members, potentially generating intra-household tensions, and adversely affecting agricultural production. Although agriculture remains the primary source of livelihood in rural Nepal, its generally low productivity often fails to meet household consumption needs, thereby perpetuating high levels of poverty.

Remittance inflows have the potential to stimulate economic growth through increased savings, investment, and employment generation (Yang, 2008). However, they may simultaneously induce labour shortages in the agricultural sector, negatively affecting productivity and increasing reliance on food imports. The long-term consequences of migration—particularly its effects on family well-being and agricultural activities—therefore warrant further empirical investigation.

Drawing on empirical data, this article examines the impact of foreign labour migration and remittance flows on agricultural activities in Bardibas Municipality. Specifically, it analyzes the trends, causes, and consequences of labour migration, the utilization of remittances, and their implications for agricultural production. By addressing these issues, the study aims to contribute to policy discourse on labour migration, agricultural development, and broader socio-economic transformation.

## RESEARCH METHODS

This research employed a mixed-methods design that integrated quantitative and qualitative approaches within a descriptive and analytical research framework. The study was conducted in 2024 in Hathilet, Khayarmara, and Bijayalpura of Bardibas Municipality. These study sites were purposively selected based on several criteria, including their predominantly rural characteristics, the predominance of agriculture as the principle occupation, and the district's position among the top five migrant-sending districts in Nepal.

A two-stage sampling design was adopted for the study. For the quantitative component, a sample of 120 migrant households was determined using G\*Power software, and respondents were selected through simple random sampling. For the qualitative component, key informants—including community leaders, professionals, and residents possessing firsthand knowledge of community dynamics—were selected through purposive sampling techniques. The study utilized both primary and secondary sources of data. Primary data were collected through a structured quantitative interview schedule and a Key Informant Interview (KII) checklist. The quantitative instrument was developed in alignment with the study variables, pretested, and subsequently refined before final administration. Secondary data were gathered from books, academic journals, and both published and unpublished official and non-official documents to support the theoretical, empirical, and policy review components of the research.

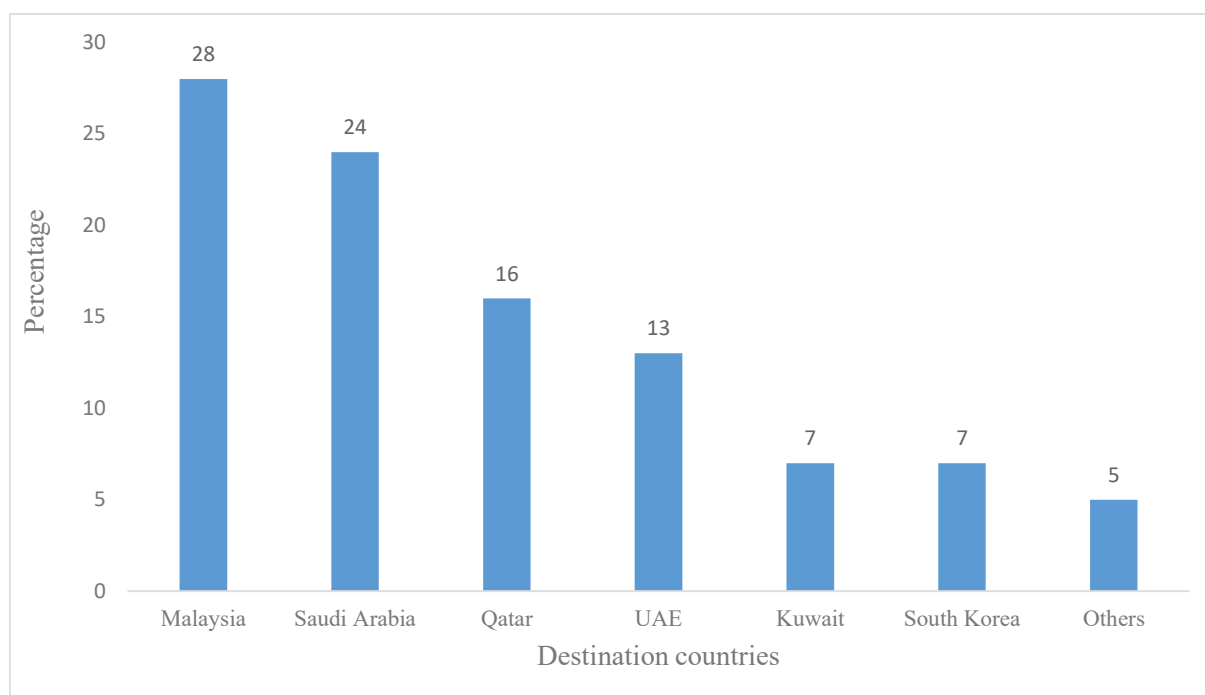
Data collection, integration, and interpretation in this research occurred at multiple stages. In the first stage, researchers gathered quantitative information. Upon completion of data recording in the quantitative interview protocol, the dataset was cleaned, edited, and entered into SPSS 25 version for analysis. Subsequently, tables, diagrams, charts, and figures were generated using SPSS and Excel to facilitate data interpretation. Inferential statistical techniques were also applied to assess the relationships between the variables examined in this research. Based on the findings from the quantitative analysis, a checklist was then developed to guide the collection of qualitative data through key informant interviews (KIIs) and case studies. The interviews and conversations were conducted in the Nepali language. Subsequently, the responses were translated into English during the transcription process. During the administration of key informant interviews and case studies, the informants' responses were recorded using voice-recording devices. In this study, we used pseudonyms for respondents when analyzing and interpreting the information obtained from the case studies. The qualitative data were then carefully transcribed and categorized to create themes, and finally, the qualitative results were utilized to interpret and triangulate as needed. In this stage, we linked the qualitative results to the quantitative results. This linkage can be described as a sequential integration approach (Morse & Niehaus, 2009).

## RESULTS AND DISCUSSION

### Status and trends of foreign labour migration

Gulf Cooperation Council (GCC) countries and Malaysia collectively accounted for 88% of the total migration from the surveyed households, indicating a substantial concentration of migrant workers in these destinations (Fig. 1). Among the individual destination countries, Malaysia (28%) and Saudi Arabia (24%) emerged as the two most preferred destinations. According to Sapkota (2024) and the Department of Foreign Employment (DoFE, 2022), these regions have consistently remained the principle destinations for Nepali migrant labour due to established bilateral labour agreements and the sustained demand for low-skilled workers in the service and construction sectors.

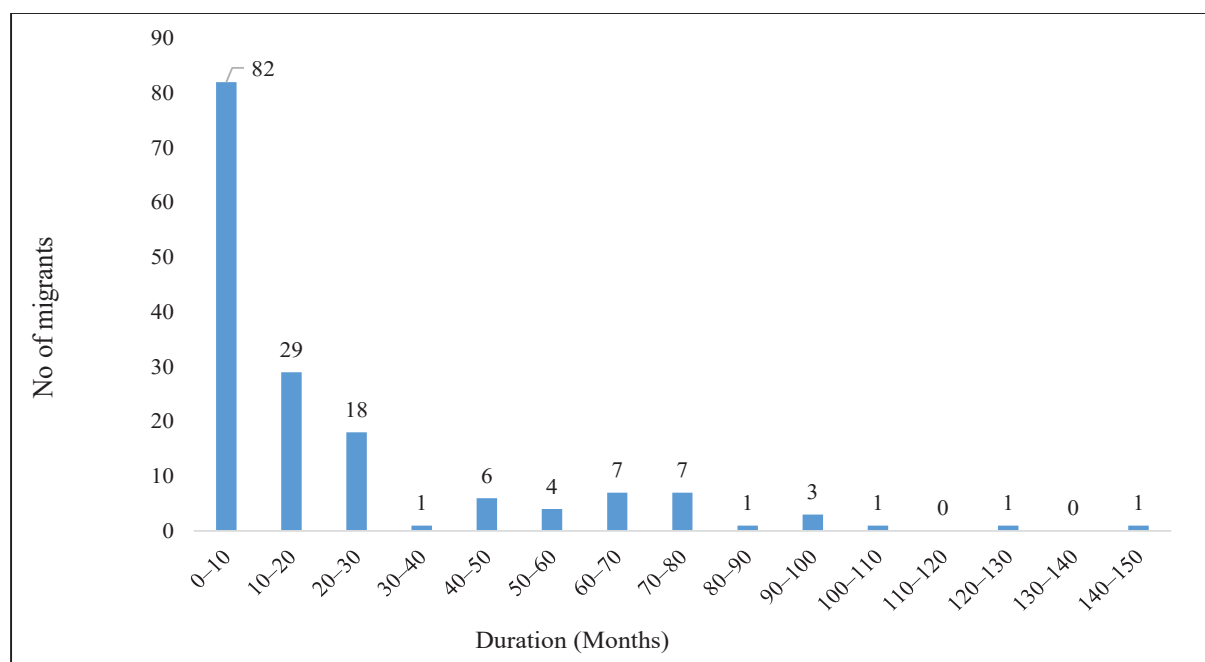
However, these findings partially diverge from recent national migration trends, which indicate a gradual diversification of labour destinations. Recent data published by the Ministry of Labour, Employment and Social Security (MoLESS, 2024) demonstrate an increasing outflow of migrant workers toward higher-income East Asian countries, particularly South Korea and Japan, facilitated through government-to-government (G2G) labour arrangements. The comparatively limited representation of migrants in these emerging destinations within the study area may be attributed to inadequate awareness and information gaps, as well as the relatively higher language proficiency and skill requirements associated with these labour markets.



**Fig. 1. Destination of migrants for foreign employment**

The findings reveal that the average duration of migration for foreign employment among the surveyed households was 19.13 months (Fig. 2). This comparatively short duration suggests the predominance of a circular migration pattern, characterized by temporary contractual employment rather than long-term or permanent settlement abroad. These findings are consistent with the observations of Gartaula and Niehof (2013), who noted that labour migration in Nepal, particularly from the Terai region, is largely temporary in nature, as migrants tend to maintain strong socio-economic and cultural ties with their ancestral households and frequently return to engage in agricultural activities.

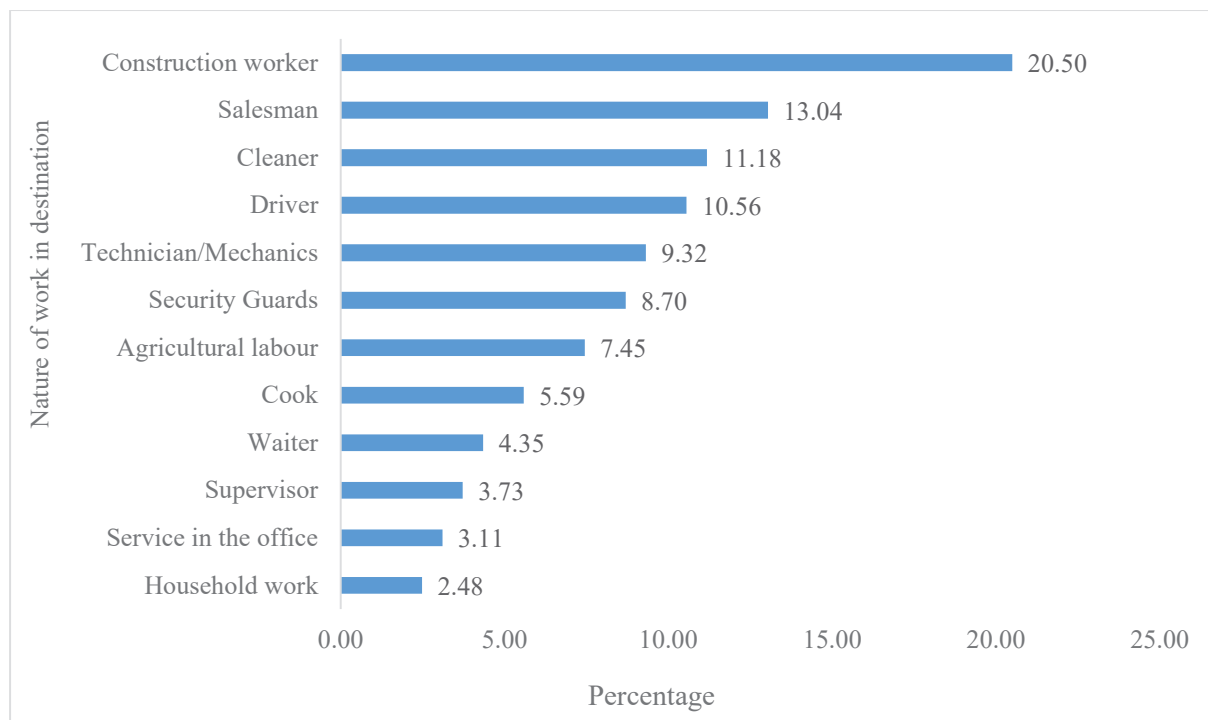
However, the observed average duration differs from the standard two-year (24-month) contractual period commonly stipulated in major destination countries such as Malaysia and the Gulf Cooperation Council (GCC) states. According to the Ministry of Labour, Employment and Social Security (MoLESS, 2022), the majority of labour approvals issued for foreign employment are granted for a minimum duration of two years. The comparatively lower mean duration of approximately 19 months may therefore indicate a tendency toward premature return migration. As argued by Sunam (2017), such early return patterns are frequently associated with the “remittance trap” and the substantial psychological and social costs of migration, whereby migrants return home before completing their contractual period due to adverse working conditions, emotional stress, or pressing family obligations.



**Fig. 2. Duration of staying in a foreign country for foreign employment**

The empirical findings presented in Fig. 3 reveal that migrant employment is predominantly concentrated in manual and service-oriented sectors. A substantial proportion of respondents reported that the migrants working in the construction sector (20.5%), followed by salesmen, cleaners, drivers, mechanics, security guards, agriculture labour, etc. These results correspond with recent World Bank (2024) reports identifying the Nepal–Gulf Cooperation Council (GCC) corridor as a major channel for low-skilled, temporary labour migration. Such patterns suggest that most migrants are engaged in “3D” (dirty, dangerous, and degrading) jobs, which may provide short-term financial benefits but offer limited opportunities for long-term career progression.

Furthermore, the findings support arguments given by Sunam (2023) that the transition toward high-skilled or semi-skilled employment remains slow despite the increasing scale of international migration. Although a small number of respondents reported working as technicians and mechanics (9.32%), this does not yet constitute a significant structural shift toward skilled labour migration. The continued concentration in low-skilled, short-term sectors constrains long-term skill accumulation and may perpetuate cycles of repeated migration. This limited upward occupational mobility reflects structural barriers within destination-country labour markets, thereby challenging the optimistic neoclassical assumption that migration inherently catalyzes sustained human capital development among Nepali youth.



**Fig. 3. Nature of work of migrants in the destination**

### Drivers of migration: economic necessity vs social prestige

The determinants of migration were assessed using a five-point Likert scale (where, 5-Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree, 1-Strongly Disagree). The findings indicate that international labour migration in the study area is primarily driven by structural economic constraints. The highest levels of agreement were recorded for “Lack of employment opportunities”, “Low individual income”, and “Poor household economic conditions”. As an interviewee, Bishnu (31) concluded: “Multiple factors influence migration decisions, including low economic status, limited agricultural land, reliance on working on others’ land, and unemployment. Historically, most migrants from Bardibas Municipality have been engaged in farming and animal husbandry for several generations.” These results strongly support Neoclassical Economic Theory, which posits that wage differentials and the pursuit of higher returns to labour are central drivers of migration. The findings are also consistent with the New Economics of Labour Migration (NELM), suggesting that migration functions as a household-level strategy to overcome local credit constraints and diversify income sources. Moreover, strong agreement with statements such as “Food insecurity” and “Decline in agricultural production” underscores the role of migration as a coping mechanism in response to agrarian decline. As noted by Sunam (2017), when local agriculture fails to sustain household livelihoods, migration becomes a “pathway out of poverty.” This dynamic is particularly evident in the study area, where immediate economic push factors appear to outweigh comparatively gradual environmental pressures, such as climate change.

However, migration decision-making is not exclusively economic. Although “Social impression/prestige” received a moderate mean score, the findings suggest that migration is increasingly embedded within broader social norms. Paudel and Ryu (2023) argue that a “culture of migration” has emerged in many districts of Nepal, where foreign employment is perceived as a rite of passage among young men. Such cultural norms may render domestic agricultural work less desirable, regardless of local economic opportunities. While “Peer pressure” and “Family pressure” received relatively lower scores, the results indicate that rural communities in Nepal

are gradually transitioning toward a context in which migration, though initiated by economic push factors, and is reinforced by social values that privilege international employment over traditional agricultural labour.

**Table 1. Descriptive Statistics on causes of international labour migration**

| Causes                              | Mean scale | Std. deviation |
|-------------------------------------|------------|----------------|
| Food insecurity                     | 4.06       | 1.007          |
| Decline in agricultural production  | 3.80       | 0.763          |
| Poor household economic conditions  | 4.14       | 0.833          |
| Low individual income               | 4.14       | 0.843          |
| Limited employment opportunities    | 4.34       | 0.739          |
| Poor of education                   | 3.58       | 0.958          |
| Interest in Property Accumulation   | 3.61       | 0.802          |
| For loan Payment                    | 3.74       | 0.966          |
| For child education                 | 3.88       | 0.989          |
| Family pressure                     | 2.64       | 1.295          |
| Peer pressure                       | 2.52       | 1.100          |
| Social impression (prestige)        | 3.18       | 1.004          |
| Limited access to social protection | 2.92       | 0.984          |
| Natural resources depletion         | 3.16       | 0.870          |
| Environmental degradation           | 3.22       | 0.884          |
| Climate change                      | 3.34       | 0.865          |
| Others                              | 3.24       | 0.608          |

### Remittance inflow and utilization patterns

The findings of this study show that as many as 88.3% of the migrant households receive money through banks and 9.2% through remittance companies. This overwhelming reliance on formal channels amounts to 97.5%, showing that a high level of financial inclusion and resultant faith in the national banking system exists among rural households in Mahottari. These results are strongly supported by recent data from the Nepal Rastra Bank (2023), which indicate that the institutionalization of remittance channels has been a successful by-product of increased banking reach and government incentives designed to discourage illegal transfers. Secondly, the shift towards formal channels is also supported by the arguments of Sapkota (2020), who mentioned that the expansion of digital banking and mobile-based remittance apps in Nepal has greatly reduced the formal financial entry barriers for the migrant families.

However, with the meager percentage of the Hundi System usage (0.8%), as exhibited in the study, a contradiction is seen with concerns raised nationally regarding capital flight through informal channels. Although this study has reflected that the hundi system is almost dead in the study area, informal channels being dominant in the overall remittance economy of Nepal was reflected in another study done by Shrestha and Joshi (2021). It was observed that informal channels play a dominant role in the remittance economy of Nepal, specifically among undocumented migrant workers who do not hold the appropriate legal documents to access the formal banking sector. The meager usage of informal channels, as reflected in the study, could be due to the overall socioeconomic background of respondents in Mahottari, a region that is already quite literate and possesses good infrastructural facilities, compared to other highly

remote areas of Nepal where the informal channel is preferred due to its faster, albeit risky, option compared to formal channels (Thapa, 2019).

**Table 2. Medium of remittance received**

| Mode of receiving remittance | Frequency | Percent | Cumulative percent |
|------------------------------|-----------|---------|--------------------|
| Banks                        | 106       | 88.3    | 89.8               |
| Remittance Companies         | 11        | 9.2     | 99.2               |
| Hundi                        | 1         | 0.8     | 100.0              |
| Total                        | 118       | 98.3    | -                  |

From the results of the remitted income utilization (Table 3), it can be noted that there is a high level of prioritization of immediate household and human capital needs over agricultural modernization. This is based on their high dependence on remittances as savings (69.2%), children's education (63.2%), and debt repayment (61.5%). However, it is also noted that agricultural tool modernization attracts only a meager level of investment (3.4%), implying that there is a severe capital discipline challenge in agricultural development in spite of the availability of immigrant capital.

This result is comparable with the notion of the "Remittance trap" formulated by Sunam (2017), who found that rural Nepalese households tended to redirect the earnings from migration towards the payment of debts and non-farm consumption, rather than investing it in the formation of agricultural capital. Notably, Bhandari (2004) observed that in the rural Nepalese context, the remittances tended to be perceived as a mode of achieving relative deprivation and social mobility through the acquisition of land and education.

Although the data support that remittances do relax credit constraints, as proven by 61.5% using their funds for debt repayment, this has not brought the "Remittance Effect" of technological adoption in Mahottari's cereal sector. Low investment in tools (3.4%) suggests that high input costs and the "Lost Labour Effect" make agricultural investment appear high-risk or low-return compared to the immediate stability offered by saving and education (Taylor, 1999).

**Table 3. Purpose of using remitted income**

| Purpose of using remitted income     | Responses<br>(N) | Percent<br>(%) | Percent of Cases<br>(%) |
|--------------------------------------|------------------|----------------|-------------------------|
| Repay the debt                       | 72               | 20.3           | 61.5                    |
| Education of children                | 74               | 20.8           | 63.2                    |
| Land purchasing                      | 37               | 10.4           | 31.6                    |
| Purchasing modern agricultural tools | 4                | 1.1            | 3.4                     |
| Purchasing other assets              | 34               | 9.6            | 29.1                    |
| Hiring labour                        | 30               | 8.5            | 25.6                    |
| Saving                               | 81               | 22.8           | 69.2                    |
| Small business                       | 11               | 3.1            | 9.4                     |
| Others                               | 12               | 3.4            | 10.3                    |
| Total                                | 355              | 100.0          | 303.4                   |

The findings indicate that a substantial proportion of migrant households (N = 37) allocated remittance income toward land acquisition, with an average purchase size of 4.54 Kattha (Table 4). This pattern underscores the centrality of land as a preferred asset among Nepali migrant households, functioning not only as a form of economic security or “safety net” but also as a marker of upward social mobility. These results strongly support the New Economics of Labour Migration (NELM) framework, which conceptualizes migration as a household strategy to overcome local credit constraints and accumulate capital for domestic investment (Stark & Bloom, 1985). Furthermore, the preference for land as a primary investment vehicle aligns with Sunam’s (2017) observation that, in rural Nepal, land represents the most tangible and socially prestigious form of capital accumulation derived from foreign employment.

Nevertheless, the relatively modest mean landholding size (4.54 Kattha), coupled with a high standard deviation (SD = 4.05), suggests significant variation in the scale of land investment across households, likely reflecting disparities in remittance earnings. This uneven pattern of acquisition reveals a paradox in relation to agricultural commercialization. While Bhandari (2004) argues that remittance-driven land purchases can stimulate rural land markets, Gartaula and Niehof (2013) caution that such investments may contribute to a “Remittance Trap,” whereby productive agricultural land is acquired primarily for social prestige or prospective residential conversion rather than for enhanced agricultural productivity.

Thus, although remittance inflows alleviate capital constraints at the household level, it may simultaneously exacerbate land fragmentation. This process can undermine the technical efficiency of cereal cultivation and limit the broader transformative potential of remittance-led investment in the agricultural sector.

**Table 4. Total unit of land (Kattha) purchased using remittance funds**

| Variable                             | N  | Range | Minimum | Maximum | Sum | Mean | Std. deviation | Variance |
|--------------------------------------|----|-------|---------|---------|-----|------|----------------|----------|
| Total Unit of Land Purchase (Kattha) | 37 | 15    | 1       | 16      | 168 | 4.54 | 4.051          | 16.408   |

The findings presented in Table 5 indicate an emerging pattern in remittance utilization, with a substantial proportion (73.0%) allocated to the construction of residential buildings rather than to productive agricultural investments. This emphasis on non-productive assets is consistent with Sunam’s (2017) assertion that remittance inflows in rural Nepal have fostered a “real-estate-led” development trajectory, wherein residential security and social prestige take precedence over agricultural reinvestment.

However, the results offer a nuanced departure from the conventional “conspicuous consumption” narrative. Although investment in farming (21.6%) and animal husbandry (5.4%) remains relatively limited, the study suggests that households are increasingly diversifying their expenditure priorities toward human capital formation and financial savings, thereby supporting Sapkota’s (2024) argument regarding shifting remittance strategies.

Despite these adaptive strategies, the data also point to the persistence of a “remittance trap.” While migration contributes to short-term poverty alleviation, it has yet to generate structural transformation or agricultural commercialization due to minimal reinvestment in productive land use. This pattern aligns with the findings of Gartaula et al. (2012), who argue that the “lost

labour effect” associated with migration often results in agricultural de-intensification, as the physical labour required for farming is effectively replaced by increased food imports and the expansion of residential infrastructure.

**Table 5. Use of Remittance for Land Purchase for Various Purposes**

| Purpose of Land Purchase        | Frequency | Percent | Cumulative Percent |
|---------------------------------|-----------|---------|--------------------|
| For the construction of a house | 27        | 22.5    | 73.0               |
| For farming                     | 8         | 6.7     | 94.6               |
| For animal husbandry            | 2         | 1.7     | 100.0              |
| Total                           | 37        | 30.8    | -                  |

### **Impact on agriculture: The lost labour effect and technology adoption**

The findings indicate that the most pronounced consequence of migration is the shortage of family labour and the associated increase in labour costs (Mean = 3.89). This provides empirical support for the “Lost Labour Effect” in the study area, whereby the absence of the active male labour force necessitates hiring external labour at higher wages. These results are corroborated by Maharjan et al. (2012), who argued that male out-migration creates a “management deficit” and imposes additional burdens on the remaining household members. Additionally, the moderate agreement regarding the increase in fallow land (Mean = 3.44) suggests a pattern of agricultural de-intensification, consistent with Gartaula et al. (2012), who observed that land often remains uncultivated in rural Nepal when labour is scarce.

The data also reveal a complex trade-off in agricultural productivity. Respondents consistently reported that migration leads to a reduction in crop production (Mean = 3.69), which contrasts with the expectations of the New Economics of Labour Migration (NELM) theory. According to Stark and Bloom (1985), the “Remittance Effect” should offset labour shortages by alleviating liquidity constraints. Indeed, respondents reported using remittances to access hybrid seeds and fertilizers (Mean = 3.63); however, investment in agricultural machinery was relatively low (Mean = 2.88). This limited technological adoption aligns with the “Inverted-U” pattern proposed by Taylor et al. (2003), whereby initial productivity declines are gradually mitigated over time through incremental adoption of technology, ultimately compensating for labour losses in the long term.

**Table 6. Consequences of foreign labour migration in household agricultural activities**

| Consequences   | Mean | Std. deviation |
|--|------|----------------|
| Decreased crop production                                | 3.69 | 1.035          |
| Shortage of family labour and increased wage labour cost | 3.89 | 0.933          |
| Increase in area of fallow land                          | 3.44 | 1.129          |
| Stop livestock rearing                                   | 3.02 | 1.181          |
| Left agriculture   | 2.86 | 1.183          |
| Access to hybrid seed and fertilizer                     | 3.63 | 0.996          |
| Access to improved livestock                             | 3.28 | 1.070          |
| Agriculture machinery purchase                           | 2.88 | 1.168          |
| Start of farm business                                   | 2.64 | 1.075          |
| Agricultural others                                      | 3.00 | 0.756          |

The results presented in Table 7 reveal a substantial transformation in farm management, with the migrant's spouse emerging as the primary household member responsible for all agricultural activities, from field preparation (37 HHs) to harvesting and marketing (33 HHs). As Nawaraj (41) disclosed: "The workload on my wife was particularly heavy during my absence. Around a decade ago, access to agricultural machinery such as tractors was limited, and farming was predominantly carried out through 'Perma', a traditional system of reciprocal labour exchange. She managed agricultural activities manually, without the benefit of mechanized tools. This pronounced "feminization of agriculture" aligns with the findings of Adhikari and Hobley (2023), who demonstrated that women assume a "triple burden" as they manage farm work, household responsibilities, and community engagement in the context of male out-migration.

Despite assuming managerial roles, women appear to adopt a "labour-substituting" strategy for physically demanding tasks. For instance, the high use of hired labour (29 HHs) and machinery (11 HHs) during field preparation suggests an effort to compensate for the reduced "muscle power," consistent with observations by Gartaula et al. (2012). Nevertheless, for highly labour-intensive manual operations such as weeding and thinning, dependence on family labour remains high (33 HHs). This pattern indicates that, while mechanization alleviates some physical burdens, women continue to perform the most strenuous manual tasks themselves, supporting the "feminization of drudgery" thesis proposed by Tamang et al. (2014), which posits that women's physical workloads increase without corresponding improvements in access to labour-saving technologies for secondary operations.

At the same time, the literature suggests that this shift in responsibility may enhance women's agency and decision-making power. However, the present study shows that traditional patriarchal influences persist in certain domains. For example, fathers continue to oversee irrigation in 26 households, and plant protection decisions also remain male-dominated, reflecting the persistence of gendered divisions in technical knowledge and authority. These findings indicate that although migration drives functional shifts in farm management, it does not immediately dismantle entrenched gender hierarchies in technical and decision-making roles.

**Table 7. Gender-wise division of labour and management strategies in migrant households**

| Agricultural activity    | Primary family member responsible (Frequency) |        |        | Management strategy adopted (Frequency) |              |         |
|--------------------------|---|--------|--------|---|--------------|---------|
|                          | Spouse  | Mother | Father | Family Labour                           | Hired Labour | Machine |
| Field Preparation        | 37  | 5      | 24     | 15                                      | 29           | 11      |
| Sowing / Transplantation | 37  | 15     | 16     | 25                                      | 26           | 7       |
| Irrigation               | 35  | 6      | 26     | 36                                      | 19           | 6       |
| Weeding / Thinning       | 33  | 19     | 15     | 33                                      | 18           | 4       |
| Plant Protection         | 34  | 9      | 21     | 42                                      | 14           | 6       |
| Harvesting / Marketing   | 33  | 12     | 18     | 30                                      | 24           | 6       |

The empirical findings confirm a pronounced "Remittance Effect," whereby migration generates capital inflows that facilitate agricultural modernization. As presented in Table 8, the adoption of improved irrigation systems (93.8%), hybrid seeds (90.6%), and insecticides (90.6%) reflects a shift from labour-intensive to more capital-intensive farming practices. As one interviewee, Furba (36) mentioned: "During my absence, my children managed both their studies and agricultural responsibilities, while my wife bore the greater share of the workload. Our family

hired external labour; and used farm machinery to carry out agricultural activities instead of the traditional “Perma’ system’, a form of reciprocal labour exchange within the community.” The findings also align with Sunam (2017), who argued that remittance inflows enable smallholders in rural Nepal to transition from low-input subsistence systems to higher-input commercial farming.

Moreover, the coverage of veterinary services across 70.3% of farms and the presence of hybrid livestock breeds on 56.3% of farms suggest that remittances are contributing to diversification into livestock production. This observation supports findings of Paudel et al., (2019) which claims that remittance-receiving households in the Inner Terai tend to invest more in technological improvements compared to non-remittance households.

However, a notable limitation is evident in the low adoption of knowledge-intensive practices, such as soil testing (7.8%) and nutrient management (34.4%). Despite improved liquidity, the persistence of a “management deficit” associated with male migration—commonly referred to as the lost labour effect—may constrain engagement with technical practices requiring careful supervision (Maharjan et al., 2012). Additionally, the high reliance on chemical inputs, particularly insecticides and pesticides (90.6%), indicates a potentially unsustainable pathway of remittance-driven intensification. This overdependence on agrochemicals may undermine the positive relationship between remittance inflows and productivity growth, as described by the “inverted-U” model (Taylor et al., 2003), potentially degrading soil fertility and threatening the long-term sustainability of agricultural intensification.

**Table 8. Use of remittance for the adoption of new agricultural practices**

| Adoption of new agricultural practices/technology | Responses<br>(N) | Percent<br>(%) | Percent of cases<br>(%) |
|---|------------------|----------------|-------------------------|
| Use hybrid seed                                   | 58               | 17.3           | 90.6                    |
| Use a hybrid breed                                | 36               | 10.7           | 56.3                    |
| Soil test   | 5                | 1.5            | 7.8                     |
| Advance nutrient management                       | 22               | 6.5            | 34.4                    |
| Changes in varieties                              | 52               | 15.5           | 81.3                    |
| Facilities of irrigation                          | 60               | 17.9           | 93.8                    |
| Insecticides/pesticides                           | 58               | 17.3           | 90.6                    |
| Use of veterinary medicine and services           | 45               | 13.4           | 70.3                    |
| Total   | 336              | 100.0          | 525.0                   |

a. Dichotomy group tabulated at value 1.

The study indicates that the average landholding size is 17.99 Kattha, approximately 0.61 hectares, reflecting a highly fragmented agricultural landscape that constitutes a key structural constraint to agricultural modernization. The distribution of land is characterized by a high positive skewness (2.27) and a wide range (0.5 to 120 Kattha), revealing that while a few households possess substantial land assets, the majority of farmers cultivate marginal plots. These findings align with Ghimire et al. (2022), who noted that in Nepal’s Terai region, small and scattered landholdings significantly increase per-unit production costs, limiting the economic feasibility of individual ownership of heavy machinery. This “scale effect” underscores how the prevailing land tenure structure incentivizes smallholders to rely on traditional, labour-intensive practices or adopt a pattern of agricultural de-intensification.

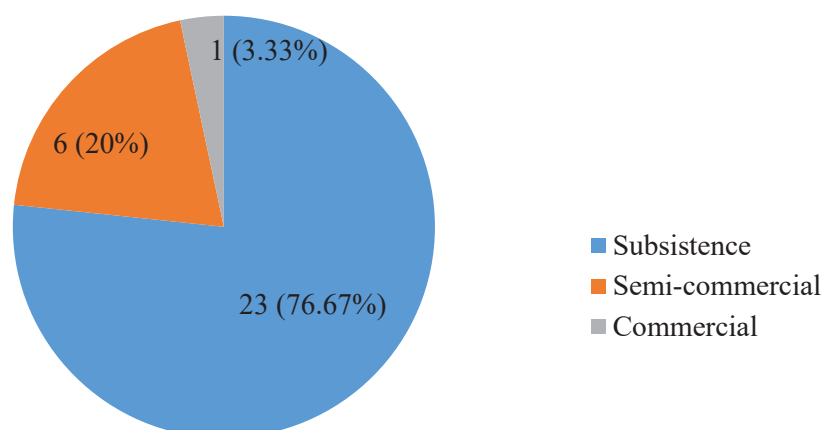
Nevertheless, the relationship between land size and mechanization is not unequivocal. Takeshima (2017) argues that, even on small plots, farmers can successfully utilize mechanized equipment through Custom Hiring Centers (CHCs), challenging the assumption that small landholdings inherently impede mechanization. The current study further demonstrates that extremely small plots, as little as 0.5 Kattha, pose significant technical constraints. As observed by Paudel et al. (2019), land fragmentation beyond a certain “threshold of maneuverability” limits the feasibility of mechanized operations. In this context, without interventions such as land consolidation or “land pooling” schemes, the technical efficiency of cereal cultivation is likely to remain constrained.

**Table 9. Land holding size (Kattha) of the HH in the study area**

| Statistical Parameter | Total land holding (Kattha) |
|-----------------------|-----------------------------|
| N                     | 120                         |
| Range                 | 119.5                       |
| Minimum               | 0.5                         |
| Maximum               | 120                         |
| Mean                  | 17.991                      |
| Std. Deviation        | 21.6487                     |
| Variance              | 468.665                     |
| Skewness              | 2.270                       |
| Kurtosis              | 6.00                        |

#### Returnee reintegration and subsistence farming

These study findings reveal a concerning trend in the post-migration agricultural involvement of returnees, with a large majority (76.67%) remaining engaged only in subsistence farming (Fig. 4). Only a small fraction (3.33%) managed to establish fully commercial enterprises. The high level of engagement in subsistence farming supports the "reintegration failure" thesis proposed by Kharel (2023), which suggests that simply acquiring overseas capital is not enough to drive agricultural modernization. These results align with those of Sunam (2017), who, while highlighting structural barriers in rural Nepal such as limited market access and inadequate irrigation, argued that returnees are generally reluctant to pursue risky commercial ventures over household food security. The findings of this study contradict the research by Paudel et al. (2019) in Inner Terai, where there was a higher intention among returnees to invest in high-value products like poultry and tunnel farming. This indicates that although rural migrants may intend to commercialize, the absence of a "conducive ecosystem," such as technical skills, remains a significant barrier, as demonstrated in this study.



**Fig. 4. Migrant involvement in agriculture after return from abroad**

## CONCLUSION

Foreign labour migration in Mahottari is fundamentally driven by the lack of local employment opportunities, setting up a distinct agrarian paradox. While remittances have indeed ensured financial inclusion and improved household welfare through savings, education, and debt repayment, they have not been applied toward agricultural capital formation. A severe "Lost Labour Effect" has contributed to feminization of agriculture and increased female drudgery, particularly in labour-intensive activities like field preparation. Though remittance income has enabled the adoption of biological inputs such as hybrid seeds and fertilizers by relaxing liquidity constraints, the transition toward mechanization remains limited. Moreover, a high returnee rate turning back to subsistence farming raises questions regarding the failure in productive reintegration. This leads to the conclusion that remittances act as a safety net rather than as a driver of agricultural transformation. Any future intervention thus needs to connect remittance income with agricultural mechanization and supplement returns with technical inputs to ensure sustainable commercial productivity.

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## AUTHOR CONTRIBUTIONS

**KPT:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing; **KA:** Data curation, Writing – original draft; **SC:** Investigation, Data curation; **RN:** Investigation, Data curation; **SP:** Investigation, Data curation.

## CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## ETHICAL APPROVAL AND PERMITS

Not applicable.

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