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Impact of remittances on financial asset accumulation and business investment in Nepal

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Abstract

Remittances from abroad play an important role in shaping the economic landscape of developing countries such as Nepal, contributing significantly to poverty reduction, household income, and economic resilience. They are an important source of foreign exchange and financial support, often surpassing foreign aid and investment. Despite their growing volume, the use of remittances in productive areas such as financial assets, consumption, and investment remains under-researched. This study addresses the research question: To what extent do remittances influence financial asset accumulation, consumption, and investment in the Nepali context? We employed a quasi-experimental research design using secondary data from the World Bank's household survey, applying the propensity score matching method. Remittances had a positive and significant impact on financial asset accumulation, food and non-food consumption, and durable goods inventory. However, no significant effect on education and health expenditures or business investment was observed, indicating challenges to long-term sustainability in the health and education sectors. Our findings suggest that while remittances are vital for immediate consumption and asset acquisition, their contribution to long-term development remains limited. Policymakers should therefore design strategies to redirect remittance flows toward more productive sectors.

Keywords Use of remittance, Impact, Financial assets, Consumption, Nepal

1 Introduction

Remittances sent by migrant workers to their home countries have become a crucial source of income and economic stability for many low- and middle-income countries, supporting household consumption, education, healthcare, and investment and improving livelihoods. They have emerged as a vital lifeline for many economies, especially during conflicts, natural disasters, and pandemics. Remittances are particularly important for least developed countries, contributing significantly to household welfare, foreign exchange reserves, and poverty reduction.

Foreign labor migration and remittance inflows have a long history in Nepal, starting with the Sikh ruler Ranjit Singh, who went to Lahore to join the army in the early nineteenth century [1], and with Nepalis being recruited by the British army (Gurkhas)

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in 1815/16. The outflow of Nepali labor to foreign countries and the inflow of remittances began to rise significantly after 1996 and further accelerated from 2001. According to DoFE [2], the number of permits increased from 2000 in 1993/94 to a peak of over 500,000 in 2013/14. The massive earthquake in Nepal on April 25, 2015, was a major cause of the decrease in foreign employment from 2014/15 to 2020/21. Nevertheless, foreign employment has since recovered to near its peak level. As of mid-July 2024, more than 6.86 million labor permits have been issued. Furthermore, according to the National Statistics Office [3], more than 2.19 million people from 1.55 million households—representing 23% of total households— are absent and living aboard. However, in the Nepali context, discrepancies often exist between official data and actual absentee figures, as some individuals migrate through informal routes, such as via India.

Moreover, remittance inflows increased from 1.5% of Nepal's GDP in 1993 to 27.6% in 2015 and stood at 26.9% as of 2023 [4]. Nepal ranks among the top ten remittance-receiving countries among low- and middle-income countries and is a leading country in South Asia in terms of its contribution of remittances to GDP [5]. Remittance income has stabilized Nepal's macroeconomic situation, helping to maintain household consumption during economic shocks and supporting national foreign currency reserves [5]. At the household level, recent survey evidence also highlights the growing reliance of Nepali households on remittance income: Karki [6] finds that 9% of households identify remittances from family members working abroad as their primary source of income.

While the historical context is important, the contemporary policy relevance of remittance flows calls for a focused analysis of how they are utilized at the household level. Previous studies worldwide have examined the impact of remittances on socioeconomic factors, including domestic capital formation [7–9], productive expenditure [10], coping with natural disasters [11], consumption [12–14], savings [15], and educational attainment [16]. These studies highlight their significant and varied impacts in recipient countries, influencing not just short-term consumption habits but also long-term development outcomes.

Similarly, in the context of Nepal, most studies have examined the impact of remittances at the household level, focusing on consumption [17–19], health and education attainment [16, 20, 21], and capital formation [22]. These studies underscore the significant role of remittances in financial asset accumulation and business investment.

However, these studies utilized either older household survey data or macroeconomic time-series data to investigate the impact of remittances on household consumption and expenditure on health and education. To address this gap, we examine the impact of remittances on financial asset accumulation, business investment, food and non-food consumption, education and health expenditure, and durable goods inventory at the household level using secondary data from a household survey conducted by the World Bank in Nepal from 2016 to 2018 [23], which are most recent household survey data in Nepal related to remittance and its utilization.

Understanding the allocation and consumption patterns of remittance income is important for designing policies that enhance its developmental impact. Accordingly, this study systematically examines how remittances influence household economic behavior in Nepal, using recent micro-level data. Specifically, it assesses the extent to which remittance income contributes to financial asset accumulation and analyzes its

role in shaping household consumption patterns, thereby addressing two research questions: first, how do international remittances affect the accumulation of financial assets among recipient households? Second, to what extent are remittances used for consumption versus productive investment?

2 Literature review

The diverse range of studies on the impact of remittances has spanned various dimensions of economic and social development. Globally, studies have consistently highlighted their effect on patterns of household consumption—referring to spending on goods and services, such as food, education, and healthcare, that directly improve living standards and address immediate needs [24]. In contrast, investment refers to the allocation of resources into assets or activities that generate future returns, including expenditure on land, housing, business ventures, or education as a form of human capital development [25]. The relationship between remittances, consumption, and investment has been widely studied, with evidence indicating that remittances significantly increase both consumption and investment among recipient households. However, their effect on consumption is often greater, as families tend to prioritize immediate needs, allocating remaining funds to productive investments [24, 25]. This pattern suggests that while remittances play a vital role in improving household welfare, their potential to drive long-term economic growth is less fully realized.

Thapa and Acharya [18] adopt propensity score matching (PSM) to examine the impact of remittances on household expenditure patterns using the Nepal Living Standards Survey 2010/11 dataset. Their results suggest that remittance-receiving households spend more on consumption, education, and health than non-receiving households. Similarly, Jayaweera and Verma [26] argue that remittances positively affect food diversity, as well as overall expenditure and calorie consumption, in Sri Lanka. Furthermore, Sangwan and Tasciotti [27] find that remittances increase total expenditure on protein-rich foods, such as meat, eggs, and pulses, as well as on vegetables and fruit, in India. Bohra-Mishra [28] also notes that remittances have positive and significant effects on food and non-food consumption in Nepal.

However, contrasting evidence exists. Adams [29] assesses the effect of domestic and international remittances on the marginal spending behavior of Guatemalan households on consumption and investment. Adams and Cuecuecha [13] further analyze the effect of domestic and international remittances on the marginal spending behavior of households in Guatemala, using a nationally representative household dataset and a Working–Leser model for data analysis. They find that households receiving international remittances spend less on food than other households. Similarly, Adams et al. [12] examine the relationship between remittances and household consumption in Ghana and find no significant difference in marginal spending on food, education, and housing between remittance-receiving and non-receiving households with similar income levels and other characteristics. Such discrepancies may stem from differing socioeconomic contexts, measurement tools, or temporal coverage.

Mishra et al. [30] investigate the impact of remittances on household expenditure in Nepal, including food and non-food items, with a focus on alcohol and tobacco, education, healthcare, clothing, and home improvements. They find remittances to be

positively associated with food and education expenditure, suggesting that they significantly influence spending on immediate household needs.

Gurung and Bhandari [31] analyze the socioeconomic consequences of remittances on households in Nepal, finding that remittance income increases expenditure on food and non-food items. The study also suggests that remittances positively affect families? human capital, as recipient households spend a greater proportion of their income on education and health services. Dhital [32] finds that remittances lead to increased spending on durable items, health, and housing in Nepal, contributing to overall household welfare. Phuyal et al. [33] observe a positive correlation between remittance income and food and non-food consumption in Nepal.

Xia et al. [8] analyze the effect of remittances, foreign direct investment, and gross capital formation on human capital development in the top ten remittance-receiving countries, using time-series data from 1980 to 2019 and employing symmetric and asymmetric estimations. They find a positive and significant relationship between remittances and human capital development.

Ngoma and Ismail [16] use cross-sectional microdata from 89 developing countries with the generalized method of moments estimator to analyze the effect of migrant remittances on educational attainment. Their results suggest that remittance inflow positively and significantly affects educational attainment, with a 1% increase in remittance inflow corresponding to a 2% rise in years of schooling at the secondary and tertiary levels.

Adams [34] argues that although remittances are a temporary source of income, households in Pakistan are more likely to direct these funds to investment goods, including human and physical capital, than toward consumption. In a later study, he finds that a large proportion of remittance income in Guatemala is spent on education [29], with households receiving domestic and international remittances spending 45% and 58% more on education than those without remittances, respectively. In a cross-country study, Zhunio et al. [35] find that remittances play a major role in improving primary and secondary education outcomes. Amega [36] also concludes that remittances can significantly improve the education outcomes of receiving households in sub-Saharan Africa, and Arif et al. [37] similarly find that they make a significant contribution to the development of higher education in top remittance-receiving countries.

Karki Nepal [21] studies the effect of remittances on child outcomes using data from the Nepal Living Standards Survey 2010/11 conducted by the Nepalese government, with ordinary least squares analysis indicating no effect of international remittances on child education in Nepal. Similarly, Bansak and Chezum [20] examine the impact of remittances on human capital formation in Nepal, using data from the Nepal Living Standards Survey 1995/96 and applying an instrumental variable model. They find a significantly greater impact of remittances on boys? educational attainment compared with girls. Regmi and Tisdell [38] likewise report that remittances are primarily used for household expenditure in Nepal, particularly the education of children.

In contrast, Acharya et al. [39] investigate the determinants of basic-level government school enrollment in Nepal and find that remittances have a negative impact on enrollment, raising concerns about the absence of parents due to working abroad. This suggests that educational benefits may be conditional on family structures and how remittance funds are managed.

Mohapatra et al. [11] cross-country study analyzes the role of remittances in mitigating natural disasters. In the case of Bangladesh, household consumption is higher in remittance-receiving households than in non-receiving households. Similarly, households receiving remittances in Ethiopia have greater cash reserves and sell fewer household assets to cope with drought. In Burkina Faso and Ghana, households use remittances to build concrete houses, which are safer than those built with mud [11]. The authors also argue that remittance flows increase with the occurrence of natural disasters, noting a positive relationship between remittances and the ability to cope with disaster-related damage. These findings emphasize that remittances not only increase consumption but also strengthen adaptive capacity.

Combes and Ebeke [14] study the relationship between remittances and consumption instability among 77 developing countries using time-series data from 1975 to 2004, applying ordinary least squares and the system–generalized method of moments model for data analysis. Their results suggest that remittances serve as a safety net during times of macroeconomic turbulence, including systemic banking crises, exchange rate instability, natural disasters, and agricultural shocks.

Zarate–Hoyos [10] argues that remittances play a key role in recipient households in Mexico. He finds that such households save more and behave as more rational economic agents than non-receiving households. He also notes that remittance-receiving households tend to spend more on equipment and machinery, indicating that they are investing in productive activities.

Uprety [19] examines the impact of remittances on economic growth in Nepal, exploring the relationships among remittances per capita, GDP per capita, consumption per capita, and investment per capita using the Johansen cointegration and error correction methods with 38 years of time-series data from World Development Indicators. The study concludes that remittances have a negative short-term impact on per capita GDP but no long-term effect. A positive and significant impact on consumption is observed, but no effect on investment is found.

Remittances directly contribute to increased household income in developing countries such as Nepal. According to [40], they have a positive and significant impact on food and non-food consumption and poverty reduction in Nepal. Bhadrav [41] notes that the international migration of Nepali women directly contributes to the reduction of household-level poverty. Similarly, Adams and Page [42] find that remittances significantly increase spending on food, non-food items, and education, leading to reduced poverty in recipient households.

Byanjanakar and Shakha [43] use the dataset employed in the present study to examine the impact of remittances on poverty incidence in Nepal. They find that remittance-receiving households are 2.3% less likely to fall into poverty than non-receiving households. Similarly, an increase in household assets of 1% reduces the probability of falling into poverty by 4.2%. Although they observe that remittances increase food and non-food consumption, health and education expenditure, and savings and investment, they find no evidence that they increase household assets.

In summary, these studies show that remittances are an important source of income in underdeveloped and developing countries, including Nepal. Various studies [10, 13, 16–19] suggest that international remittances enhance household consumption, improve access to health and education services, and contribute to financial asset accumulation.

However, the findings are mixed and context-dependent. While some studies highlight positive impacts on savings and investment [25, 35], others note that remittances are primarily used for daily consumption, with limited contribution to long-term capital formation [19, 29]. Moreover, limited attention has been paid to the differential impact of remittances on distinct economic outcomes such as financial asset accumulation, productive investment, and durable goods acquisition, particularly in the Nepali context. The existing literature also often lacks a holistic analysis based on recent household-level data and robust econometric methods to evaluate how remittance income is allocated across various household needs. This study addresses these gaps by applying PSM to recent micro-level data from Nepal (2016/2018) to examine the effects of remittances on household economic behavior, focusing on financial asset accumulation, consumption, and investment.

Remittances have become an important financial resource for households in Nepal, enabling improvements in living standards, education, and food security. However, their effects are not uniform and depend on factors such as the national context and specific economic conditions. This study contributes to the ongoing discourse by providing empirical evidence on the impact of remittances on financial asset accumulation, durable goods inventory, food and non-food consumption, and education and health expenditure in Nepal, offering insights to inform policy decisions aimed at maximizing the benefits of remittance inflows. These relationships are illustrated in the conceptual framework presented in Fig. 1.

3 Methodology

This study adopted a quasi-experimental, cross-sectional design using secondary data on remittances and household expenditure in Nepal. PSM was employed to investigate the impact of remittances on household economic activities in the absence of randomized assignment. PSM is a useful technique for estimating counterfactual outcomes by matching remittance-receiving and non-receiving households with similar observed

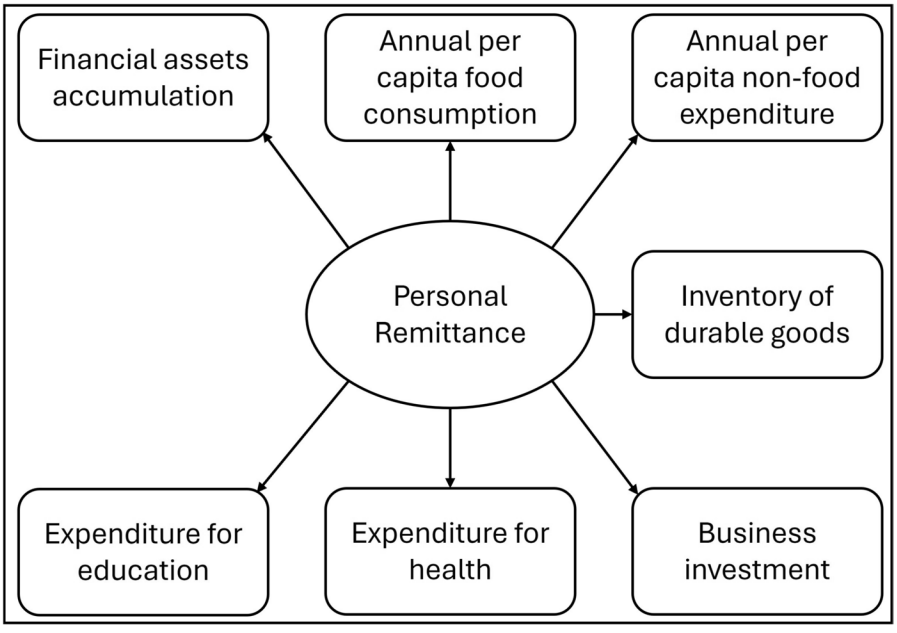


Fig. 1 Conceptual framework

covariates. This research design is appropriate for investigating causal relationships using observational data in the absence of random assignment, a common limitation in migration and remittance studies [44, 45].

We used secondary data from the 'Household Risk and Vulnerability Survey' conducted by the World Bank to analyze the impact of remittances on household economies in Nepal. The data were obtained between 2016 and 2018 (Wave 1 in 2016, Wave 2 in 2017, and Wave 3 in 2018) from 6051 households in 50 of Nepal's 77 districts [23]. During this period, Nepal experienced several natural shocks that affected household economic activities [22, 46], notably the 2015 earthquake and the 2017 floods, which left many households in urgent need of money. In 2016 and 2017, many households received emergency remittances or shifted their expenditure toward immediate needs. Consequently, the effects of remittances in those years may differ from those under normal conditions. Therefore, although three waves of panel data were available, only the third wave of cross-sectional data, collected between June 10 and August 22, 2018, was used in this study. This choice was made to ensure that the analysis reflects more stable, post-disaster economic behavior and avoids distortion from short-term shocks in earlier years, thereby improving the internal validity of the findings. Out of the 6051 households, family details were lacking for six households, and numerical values were missing for another 14 households. The data for these households were omitted, resulting in a final sample size of 6031.

Demographic variables, such as the gender and highest education level of the household head, number of household members, caste, province, and distance to the nearest market, were retrieved from Sections 0–4. Annual household expenditure on education and health was retrieved from Sections 2 and 3, respectively. Data on durable goods inventory, including crockery, bedding, jewelry, watches, furniture, home appliances, and vehicles, were taken from Section 6. Expenditure on annual household non-food items, including fuel, personal apparel, frequent and infrequent expenses, and miscellaneous expenses, was also calculated from data in this section. Income-related data were retrieved from Section 8. Total household annual income was calculated from revenue from livestock, equipment, and business, as well as income from rent, wages, land, livestock sales, and financial assets. The amounts related to remittances, income, expenditure, savings, and investment were collected in Nepalese Rupees (NRS) by the World Bank. Therefore, the authors have used the same currency throughout this study. According to the Nepal Rastra Bank (the central bank of Nepal), the exchange rate was 1 USD = 138.84 NRS as of June 23, 2025. The details of the data sources are presented in Appendix Table 7.

Section 10 provided information on household investment in business and non-agricultural enterprises. Migration- and remittance-related data were retrieved from Section 11, which recorded the number of family members in foreign countries, the names of destination countries, and the amount and frequency of remittances received. A dummy variable was created to indicate remittance status: households receiving any amount of remittance from overseas in a given year were assigned a value of one; all others were assigned a value of zero.

Data on financial assets were taken from Section 12, which provides information on credit, savings, and purchases of financial products. Total financial assets were calculated from bank deposits (savings and fixed-term investments), stock market investments, and

insurance policies. Annual per capita food expenditure was calculated from the cost of food purchased from markets and the estimated value of home-produced goods consumed or received in kind. Consumption data in the report were given per week; annual values were obtained by multiplying by 4 weeks and 12 months. Per capita values were calculated by dividing by the number of household members.

We conducted both descriptive and econometric analyses. PSM was used for the econometric analysis, with remittances as the control variable. We first estimated the propensity score, which is the conditional probability of receiving the treatment (in this study, remittances). The propensity score is defined as [45]:

$$P(X_i) = \Pr(R_i = 1 \mid X_i) \tag{1}$$

where:

- $P(X_i)$: The propensity score, representing the probability that household i receives remittances, given its observed characteristics.
- $\Pr(R_i = 1 \mid X_i)$: The conditional probability that the treatment indicator R_i equals 1, given the covariates X_i.
- $R_i = 1$: Household i receives remittances (treated group).
- $R_i = 0$: Household i does not receive remittances (control group).
- X_i: A vector of observable characteristics (e.g., age, household size, education, gender of household head, caste, province, etc.).

Propensity scores are estimated using the following probit regression model:

$$P(\mathrm{Rem}_i = 1) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k) \tag{2}$$

where:

- Rem_i is the remittance receipt status of household i.
- Φ is the cumulative distribution function of the standard normal distribution.
- X_k denotes covariates such as gender, education, caste, household size, province, and distance to the nearest market.
- β_k represents the coefficients to be estimated.

The average treatment effect on the treated (ATT) is a widely applied approach for comparing the outcomes of treated and non-treated groups [44, 47, 48]. Accordingly, ATT was applied to assess the impact of remittances on recipient and non-recipient households. To evaluate the effect of remittances on various dependent variables, we adopted two matching methods: nearest-neighbor matching and kernel matching. Specifically, the treatment effect of remittances was analyzed for financial asset accumulation, durable goods inventory, annual per capita food and non-food consumption, and annual household expenditure on education, health, and business investment. ATT was calculated as the average difference in outcomes between remittance-receiving and non-receiving households using the following equation [47]:

$$ATT = \frac{1}{N} \sum_{i=1}^{n} (Y_{i1} - Y_{i0}) \tag{3}$$

where:

- Y_{i1} and Y_{i0} are the outcomes for remittance-receiving and non-receiving households, respectively.
- N is the number of matched households.

The data were analyzed using the *psmatch2* command in Stata software (version 18). Propensity scores were generated using the probit model in Equation (2), with the following covariates as independent variables: gender of household head, total household members, distance to nearest market, highest education level of household head, and dummy variables for caste and province as independent variables (Appendix Table 8). All outcome variables were found to be skewed to the right and thus not normally distributed; therefore, they were converted to log values prior to PSM.

According to Caliendo and Kopeinig [2], the propensity score should fall within the range of common support, which is the basic requirement of this approach. In this study, all 6031 samples fell within the common support and were successfully matched. This confirms that the data used met the basic criterion for applying PSM. Furthermore, a balance test was conducted for each outcome variable after matching, and all results indicated good balance (Appendix Table 9 and 10). Furthermore, a table and graph of common support before and after matching are presented in Appendices 11 and Fig. 2, respectively.

4 Results

4.1 Descriptive analysis of macroeconomic variables

Table 1 presents a mean comparison t-test of continuous variables used in this study. The average household size was 4.24, close to the value of 4.37 reported in Nepal's 2021 National Population and Housing Census [3]. The minimum household size was 1, and the maximum was 17. The average age of the household head was 50.24 years, with a minimum of 15 and a maximum of 95.

Household size, dependent population ratio, distance to nearest market, highest education of household head, annual per capita income, business investment, and inventory of durable goods showed significant differences between remittance-receiving and non-receiving households, with p-values less than 0.05. On the other hand, age of household head, total financial assets, annual per capita food and non-food consumption, and

Table 1 Mean comparison test of continuous explanatory variables

Continuous explanatory variables	Receiving remittances		Overall mean	p-value
	Yes	No		
Household size	4.04	4.32	4.240	0.000
Age of household head	50.69	50.06	50.24	0.054
Dependent population ratio	65.17	51.31	55.29	0.000
Distance to nearest market (in km)	4.95	5.74	5.514	0.000
Highest education of household head (grade)	8.94	9.34	9.226	0.000
Annual per capita income (NRS)	32,767	67,546	57,541	0.000
Total financial assets (NRS)	57,571	51,950	53,567	0.107
Annual per capita food expenditure (NRS)	29,611	28,976	29,159	0.051
Annual per capita non-food expenditure (NRS)	7601	7529	7550	0.621
Annual household expenditure on education (NRS)	13,792	16,331	15,601	0.078
Annual household expenditure on health (NRS)	11,759	12,767	12,477	0.523
Business investment (NRS)	8154	17,782	15,013	0.020
Inventory of durable goods (NRS)	162,851	182,913	177,141	0.024

Table 2 Gender of household head and remittance status

Gender of household head	Yes (%)	No (%)	Total (%)
Female	734 (42)	706 (16)	1440 (24)
Male	1001 (58)	3590 (84)	4591 (76)
Total	1735 (29)	4296 (71)	6031 (100)

Table 3 Uses of remittances

Use	Yes (%)	No (%)
Non-durable consumption	1482 (85.42)	253 (14.58)
Durable consumption	382 (22.02)	1353 (77.98)
Education	713 (41.10)	1022 (58.90)
Health	585 (33.72)	1150 (66.28)
Business inputs	69 (3.98)	1666 (96.02)
Business equipment	5 (0.29)	1730 (99.71)
Land purchases	18 (1.04)	1717 (98.96)
Livestock purchases	16 (0.92)	1719 (99.08)
Improving dwelling	119 (6.86)	1616 (93.14)
Marriages/funerals/ceremonies	95 (5.48)	1640 (94.52)
Repayment of debts/interest	764 (44.03)	971 (55.97)

annual household expenditure on education and health showed no significant differences, with p-values greater than 0.05.

Table 2 presents the gender breakdown of heads of households receiving remittances from abroad. According to the data, 76% of households were headed by a male and 24% by a female, reflecting the predominance of male-headed households in Nepal. According to the Nepal Living Standards Survey 2010/11, only 5.82% of households were headed by a female [49], although this ratio increased to 31.55% in 2021 [3]. Notably, the proportion of female-headed households in this study is lower than the 2021 census figure. Of the 6031 households, 4,296 (71%) did not receive remittances from abroad, while 1735 (29%) did. Among the recipient households, 42% were female-headed and 58% were male-headed. In contrast, among the non-recipient households, 16% were female-headed and 84% were male-headed. The data thus indicate that households receiving remittances were more likely to be headed by a female. This may reflect the fact that, in Nepal, men are more likely than women to work abroad.

Households receiving remittances from abroad were asked a series of yes/no binary questions on whether they used these funds for specific purposes. The results are shown in Table 3. These data show that more households used remittance funds for non-durable consumption and debt repayment than for education and health services. Similarly, few households used remittances to invest in business activities such as inputs, equipment, or livestock. According to CBS [49], 79% of households receiving remittances primarily used them for daily consumption, 7% for repayment of loans and interest, 5% for asset accumulation, 4% for education, 2% for capital formation, and 3% for other purposes. The pattern of remittance use in this study is similar to that in 2011, even though over 10 years have since elapsed.

Table 4 presents the most common destination countries of the migrant workers in this study. A total of 2,497 migrant workers from 1735 Nepali households were working abroad, with India the most common destination (35.72%), followed by Malaysia (17.30%), Qatar (16.06%), Saudi Arabia (12.21%), and the United Arab Emirates (7.13%). Between January and July 2024, Saudi Arabia accounted for 19% of labor permits issued

Table 4 Destination of migration

Destination	Frequency	Percentage	Cumulative %
India	892	35.72	35.72
Malaysia	432	17.30	53.02
Qatar	401	16.06	69.08
Saudi Arabia	305	12.21	81.30
United Arab Emirates	178	7.13	88.43
Japan	80	3.20	91.63
South Korea	36	1.44	93.07
United States	27	1.08	94.15
Australia	21	0.84	94.99
Hong Kong	11	0.44	95.43
Other	114	4.57	100.00
Total	2497	100.00	

Table 5 ATT estimation with nearest neighbour matching method

Variable	Sample	Treated	Controls	Difference	S.E	T-stat
ln *tfasset*	Unmatched	9.775	8.614	1.161	0.087	13.31
	ATT	9.775	8.282	1.493	0.137	10.91
ln *inventory*	Unmatched	11.679	11.599	0.080	0.027	3.01
	ATT	11.679	11.441	0.238	0.044	5.44
ln *aconpercap*	Unmatched	10.214	10.185	0.029	0.012	2.53
	ATT	10.214	10.156	0.058	0.018	3.23
ln *anfconpc*	Unmatched	8.805	8.774	0.031	0.015	2.09
	ATT	8.805	8.717	0.088	0.023	3.82
ln *teduexp*	Unmatched	6.352	6.306	0.046	0.129	0.36
	ATT	6.352	6.055	0.297	0.201	1.47
ln *thelcost*	Unmatched	5.834	5.931	− 0.097	0.119	− 0.81
	ATT	5.834	5.777	0.058	0.183	0.31
ln *tbinv*	Unmatched	0.679	1.161	− 0.482	0.090	− 5.34
	ATT	0.679	0.727	− 0.048	0.127	− 0.38

by the department of foreign employment, followed by Qatar (18%), Malaysia (14%), the United Arab Emirates (13%), and Kuwait (5%) (department of foreign employment, 2024). Note that India is not included in this list because no labor permit is required to work there.

4.2 Econometric analysis

Table 5 presents ATT values for various outcome variables, estimated using the nearest-neighbor matching method. In the table, "Unmatched" indicates values before matching, while "ATT" denotes the values after matching the treated group (remittance-receiving households) with the control group (non-receiving households). For the first variable, the natural log of financial assets (ln *tfasset*), the unmatched data show that the treatment group had, on average, 1.161 times higher log financial assets than the control group, with a t-statistic of 13.31. After matching, this difference increased to 1.493, with a t-statistic of 10.91, indicating that remittances had a strong and statistically significant effect on financial asset accumulation even after adjusting for observable differences.

Another purpose of this study was to analyze the impact of remittances on the inventory of durable goods, such as electronic devices, vehicles, home appliances, jewelry, furniture, and computers. The difference in log inventory between the two groups was 0.08, with a t-statistic of 3.01, indicating that remittances have a significant impact on

durable goods inventory (Table 5). After matching, the difference increased to 0.238, with a t-statistic of 5.44, indicating a significant treatment effect. Thus, receiving remittances from abroad appears to significantly increase the value of durable goods held by households.

Another outcome variable in our study is the log value of annual per capita food consumption (ln *aconpercap*). Before matching, the log difference was 0.029, with a t-statistic of 2.53, indicating a significant difference between the two groups. After matching, the log difference increased slightly to 0.058, with a t-statistic of 3.23, demonstrating a significant impact of remittances on the treated group.

We also examined the impact of remittances on frequently consumed non-food products (ln *anfconpc*), such as fuel, personal apparel, transportation, entertainment, and newspapers. Before matching, the log difference was 0.031, with a t-statistic of 2.09, indicating a significant difference between the treated and control groups. After matching, the difference increased to 0.088, with a t-statistic of 3.82, showing a significant effect of remittances on non-food consumption in the treated group. Finally, the effects of remittances on expenditure for education (ln *teduexp*), health (ln *thelcost*), and business investment (ln *tbinv*) were examined. The t-statistics for all three variables were less than 1.96 both before and after matching, indicating no significant effects.

Table 6 presents the results of ATT estimation using the kernel-matching method. Significant positive effects of remittances were observed for financial asset accumulation, durable goods inventory, and annual per capita food and non-food consumption, similar to the results obtained with the nearest-neighbor matching method. Additionally, a positive and significant effect of remittances on education expenditure was found after matching, while a negative effect of remittances on business investment was observed before matching, with no significant difference after matching.

5 Discussion

The main purpose of this quasi-experimental study was to investigate the treatment effect of personal remittances from abroad on household economies in Nepal, using cross-sectional survey data from 6031 households. The results of the descriptive and econometric analyses revealed several key insights.

Table 6 ATT estimation with Kernel matching method

Variable	Sample	Treated	Controls	Difference	S.E	T-stat
ln *tfasset*	Unmatched	9.775	8.614	1.161	0.087	13.31
	ATT	9.775	8.129	1.645	0.085	19.31
ln *inventory*	Unmatched	11.679	11.599	0.080	0.027	3.01
	ATT	11.679	11.488	0.190	0.028	6.75
ln *aconpercap*	Unmatched	10.214	10.185	0.029	0.012	2.53
	ATT	10.214	10.169	0.044	0.013	3.44
ln *anfconpc*	Unmatched	8.805	8.774	0.031	0.015	2.09
	ATT	8.805	8.748	0.057	0.016	3.46
ln *teduexp*	Unmatched	6.352	6.306	0.046	0.129	0.36
	ATT	6.352	6.041	0.311	0.145	2.15
ln *thelcost*	Unmatched	5.834	5.931	− 0.097	0.119	− 0.81
	ATT	5.834	5.775	0.059	0.134	0.44
ln *tbinv*	Unmatched	0.679	1.161	− 0.482	0.090	− 5.34
	ATT	0.679	0.757	− 0.077	0.095	− 0.82

The descriptive analysis showed significant socioeconomic differences between remittance-receiving and non-receiving households. The former had smaller household sizes and lower per capita annual incomes, demonstrating their greater reliance on external income. The higher dependent population ratio of remittance-receiving households also suggests that more non-working members were supported by remittances. In Nepal, when a household member migrates abroad for work, their spouse and parents often also move to an urban area to obtain better education for their children.

Another aim of this study was to examine the proportion of households receiving remittances from abroad and how they use the funds to improve their livelihoods. We found that 29% of the households surveyed received remittances, which were more often used for non-durable consumption and debt repayment than for education and health expenditure. Furthermore, the proportion investing in business activities, such as inputs, equipment, and livestock purchases, was found to be low. According to CBS [49], 79% of households receiving remittances primarily used them for daily consumption, 7% for repayment of loans and interest, 5% for asset accumulation, 4% for education, 2% for capital formation, and 3% for other purposes. The pattern of remittance use in our study was therefore similar to that in 2011, despite the interval of over 10 years.

According to the Nepal Living Standards Survey 2010/11, only 5.82% of households were headed by a female (CBS, 2011), a figure that increased to 31.55% in 2021 [3]. This positive change may have been due to women?s empowerment activities run by government and non-governmental organizations, as well as the prevalence of male migration. In our study, households receiving remittances were more likely to be headed by a female, probably because their male partner was working abroad.

Our econometric analysis examined the treatment effect of remittances from abroad on various household outcomes, including financial asset accumulation, durable goods inventory, per capita food and non-food consumption, health and education expenditure, and investment in business activities.

Remittances had a positive treatment effect on food and non-food expenditure, with significant differences between receiving and non-receiving households. This result aligns with Mohapatra et al. [11] and Combes and Ebeke [14], who also found that remittances are positively associated with household consumption in Bangladesh. In contrast, Adams et al. [12] found no significant effect of remittances on consumption in Ghana.

Remittances also had a positive and significant effect on financial asset accumulation. Salahuddin et al. [15] reported a similar impact on savings in Bangladesh, including deposit pension schemes, fixed deposits, bonds, and insurance policies. Likewise, Zarate–Hoyos [10] found that remittances positively affect household savings, and Mohapatra et al. [11] observed a comparable effect in Ethiopia.

Durable goods, such as furniture, home appliances, bicycles, and motor vehicles, are recognized as indicators of improved living standards in low-income countries, with multidimensional poverty indexes including such goods [50]. According to our study, remittances from abroad had a positive effect on the accumulation of these goods, suggesting that they contribute to improved livelihoods in Nepal.

Finally, based on the results from the nearest-neighbor and kernel-matching methods, remittances had no treatment effect on education and health expenditure, or on investment in business activities, as similarly observed by Acharya et al. [39] and Karki [25] in Nepal, and Adams et al. [12] in Ghana. In contrast, Zarate–Hoyos [10] found that

remittances from migrant workers positively affect productive investment, and Yavuz and Bahadir [51] observed a positive association with entrepreneurship in developing countries. Our results suggest that remittances should be channeled into health, education, and business investment to improve the long-term financial stability of households that rely heavily on remittances from abroad.

The continued dominance of consumption and debt repayment, rather than investment in human capital or productive sectors, may reflect deeper structural issues, such as weak policy implementation, limited access to financial services, or lack of incentives for investment. Over time, this trend could contribute to underdeveloped social infrastructure, limited employment opportunities, and public dissatisfaction-factors that may ultimately destabilize the political environment.

In addition, it is often observed in Nepal that when a household member migrates abroad for work, their spouse and parents move to urban areas to access better education for their children. This rural-to-urban shift can lead to a decline in agricultural labor, negatively affecting agricultural productivity and increasing the country's reliance on imported food. These combined factors may further constrain households' ability to invest in education or entrepreneurial activities, thereby reinforcing the current pattern of remittance use.

6 Conclusion

This study analyzed the impact of remittances on financial asset accumulation, consumption, and investment in Nepal. According to our descriptive analysis, 29% of surveyed households received remittances from abroad. In addition, the primary use of remittances was for daily consumption, with 85.42% of recipient families reporting that they used remittance income for everyday expenses, including food and non-food items. However, the allocation of remittances to business activities remained low, limiting their contribution to economic development.

The results of the econometric analysis highlight that remittances significantly enhanced household financial assets and increased food and non-food consumption compared with non-recipient households. In contrast, no significant impact was found on education and health expenditure, or on investment in business activities.

In conclusion, while remittances positively affected financial asset accumulation and short-term consumption, their limited role in long-term investments such as health, education, and business activities suggests missed opportunities for sustainable development. This calls for policy interventions that incentivize the productive use of remittance income.

The Government of Nepal need to be developed and implement targeted financial literacy programs in remittance-receiving communities, focusing on savings, financial and investment planning. Matching grant schemes could be introduced to encourage remittance-receiving households to invest in small scale enterprises, vocational education, or agricultural and husbandry modernization. Furthermore, the creation of diaspora-linked savings and investment bonds, as well as mobile-friendly digital financial platforms, could help channel remittances into structured and transparent investment avenues. Partnerships with microfinance institutions and cooperatives should also be strengthened to design inclusive financial products tailored to migrant families.

The study is limited by its reliance on cross-sectional data, which constrains causal inference, and by its focus on quantitative analysis without incorporating the qualitative perspectives of remittance-receiving households. Future research could explore the longitudinal effects of remittance flows and examine behavioral factors influencing household financial decisions through mixed-method approaches, thereby enhancing understanding of how remittances can be more effectively leveraged for inclusive economic growth in Nepal.

Appendix

See Table 7, 8, 9, 10, 11 and Fig. 2.

Table 7 Variable details, sources, and transformations

Variable name	Source	Unit of measurement	Transformation
Province_dummy1	Section_0	Dummy (1 = Koshi, 0 = Other)	–
Province_dummy4	Section_0	Dummy (1 = Gandaki, 0 = Other)	–
Province_dummy5	Section_0	Dummy (1 = Lumbini, 0 = Other)	–
Province_dummy6	Section_0	Dummy (1 = Karnali, 0 = Other)	–
Province_dummy7	Section_0	Dummy (1 = Sudurpaschim, 0 = Other)	–
Gender of household head	Section_1	Dummy (1 = Male, 0 = Female)	–
Caste_dummy2	Section_1	Dummy (1 = Chhetry, 0 = Other)	–
Caste_dummy3	Section_1	Dummy (1 = Janajati, 0 = Other)	–
Caste_dummy4	Section_1	Dummy (1 = Madheshi, 0 = Other)	–
Caste_dummy5	Section_1	Dummy (1 = Dalit, 0 = Other)	–
Caste_dummy6	Section_1	Dummy (1 = Other, 0 = Reference)	–
HH head education_dummy1	Section_2	Dummy (1 = None, 0 = Other)	–
HH head education_dummy2	Section_2	Dummy (1 = Primary, 0 = Other)	–
HH head education_dummy3	Section_2	Dummy (1 = Secondary, 0 = Other)	–
HH head education_dummy4	Section_2	Dummy (1 = Higher Secondary, 0 = Other)	–
Expenditure for education	Section_2	Nepalese Rupees	Log-transformed
Expenditure for health	Section_3	Nepalese Rupees	Log-transformed
Nearest daily market	Section_4	Kilometers	–
Annual per capita food consumption	Section_5	Nepalese Rupees	Log-transformed
Annual per capita non-food expenditure	Section_6a/6b	Nepalese Rupees	Log-transformed
Inventory of durable goods	Section_6c	Nepalese Rupees	Log-transformed
Total household income	Section_8	Nepalese Rupees	Log-transformed
Business investment	Section_10	Nepalese Rupees	Log-transformed
Remittance	Section_11	Nepalese Rupees	Log-transformed
Financial assets	Section_12	Nepalese Rupees	Log-transformed

Table 8 Determinants of migration status

Variable	Coef.	dx/dy	*p*-value	Sig
hhgen_dummy1	0.708	0.216	0.000	***
s04q28a	− 0.009	− 0.015	0.000	***
lnthhincome	− 0.048	− 0.003	0.000	***
hhedu_cat_dummy2	0.036	0.011	0.436	
hhedu_cat_dummy3	− 0.163	− 0.050	0.001	***
hhedu_cat_dummy4	− 0.299	− 0.091	0.000	***
Chhetry_dummy2	0.084	0.026	0.172	
Janajati_dummy3	0.079	0.024	0.166	
Madheshi_dummy4	0.271	0.082	0.000	***
Dalit_dummy5	0.124	0.038	0.070	*
Others_dummy6	0.128	0.039	0.230	
Koshi_dummy1	0.200	0.061	0.000	***
Gandaki_dummy4	0.257	0.078	0.000	***
Lumbini_dummy5	0.125	0.038	0.028	**
Karnali_dummy6	− 0.197	− 0.060	0.010	**
Sudurpaschim_dummy7	0.249	0.076	0.000	***
Constant	− 0.400		0.000	***
Number of observations = 6031				
LR chi2(16) = 729.82				
Log likelihood = − 3254.059				
Prob > χ^2 = 0.0000				
Pseudo R^2 = 0.1008				

Table 9 Balance test for nearest neighbour matching

Variable	Treated mean	Control mean	% Bias	t	*p*-value	V(C)
hhedu_cat_dummy2	0.249	0.265	− 3.8	− 1.090	0.277	–
hhedu_cat_dummy3	0.178	0.152	6.6	2.110	0.035	–
hhedu_cat_dummy4	0.092	0.083	2.6	0.900	0.367	–
hhgen_dummy1	0.423	0.397	5.9	1.550	0.120	–
s04q28a	4.953	5.249	− 3.9	− 1.280	0.199	0.930
lnthhincome	7.996	7.786	4.4	1.160	0.246	0.89*
caste_dummy2	0.214	0.206	2.1	0.620	0.532	–
caste_dummy3	0.354	0.354	0.0	0.000	1.000	–
caste_dummy4	0.113	0.130	− 5.7	− 1.560	0.119	–
caste_dummy5	0.148	0.157	− 2.7	− 0.750	0.450	–
caste_dummy6	0.037	0.033	2.4	0.740	0.461	–
prov_dummy1	0.216	0.229	− 3.2	− 0.940	0.348	–
prov_dummy4	0.148	0.153	− 1.5	− 0.430	0.669	–
prov_dummy5	0.168	0.161	1.9	0.550	0.583	–
prov_dummy6	0.061	0.064	− 1.1	− 0.350	0.726	–
prov_dummy7	0.146	0.131	4.7	1.330	0.185	–

Ps R^2	LR chi2	Prob > χ^2	MeanBias	MedBias	B	R	%Var
0.004	19.47	0.245	3.3	3.0	15.0	1.05	50

* Variance ratio outside [0.91; 1.10]

* if $B > 25\%$, R outside $[0.5;\ 2]$

Table 10 Balance test for Kernel matching

Variable	Treated mean	Control mean	% Bias	t	*p*-value	V(C)
hhedu_cat_dummy2	0.249	0.244	1.1	0.330	0.741	–
hhedu_cat_dummy3	0.178	0.168	2.5	0.780	0.434	–
hhedu_cat_dummy4	0.092	0.087	1.4	0.480	0.630	–
hhgen_dummy1	0.423	0.418	1.2	0.320	0.750	–
s04q28a	4.953	5.185	− 3.0	− 1.000	0.319	0.90*
lnthhincome	7.996	8.108	− 2.4	− 0.620	0.533	0.910
caste_dummy2	0.214	0.217	− 0.7	− 0.200	0.843	–
caste_dummy3	0.354	0.365	− 2.2	− 0.660	0.511	–
caste_dummy4	0.113	0.101	4.0	1.140	0.253	–
caste_dummy5	0.148	0.145	0.8	0.230	0.819	–
caste_dummy6	0.037	0.035	1.0	0.310	0.756	–
prov_dummy1	0.216	0.218	− 0.6	− 0.160	0.872	–
prov_dummy4	0.148	0.153	− 1.5	− 0.420	0.672	–
prov_dummy5	0.168	0.178	− 2.7	− 0.770	0.444	–
prov_dummy6	0.061	0.061	0.0	0.010	0.993	–
prov_dummy7	0.146	0.137	2.8	0.780	0.434	–

Ps R^2	LR chi2	Prob $> \chi^2$	MeanBias	MedBias	B	R	%Var
0.001	6.40	0.983	1.7	1.5	8.6	1.05	50

* Variance ratio outside [0.91; 1.10]

* if $B > 25\%$, R outside $[0.5;\ 2]$

Table 11 Common support check of control and treated groups

Psmatch2: Treatment assignment	Common support (on support)	Total
Control	4296	4296
Treated	1735	1735
Total	6031	6031

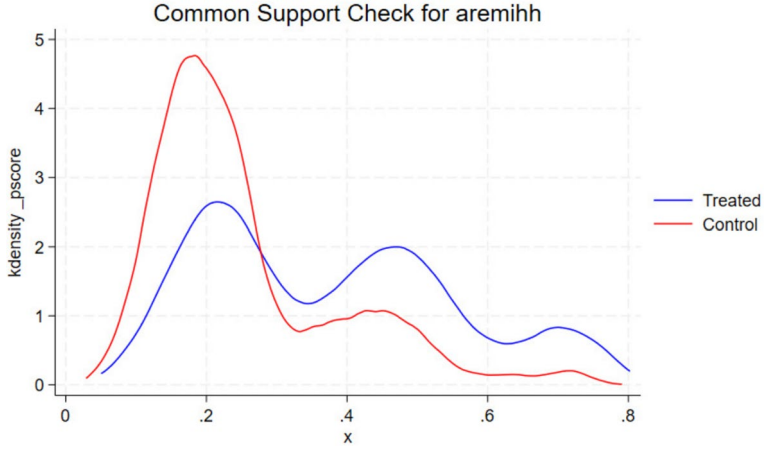


Fig. 2 Common support check for control and treated groups

Supplementary Information

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Supplementary file 1 (docx 319 KB)

Author contributions

Conception and design were performed by Shyam Kumar Karki and Isao Takagi. Modeling and data analysis were performed by Shyam Kumar Karki and Dipesh Kumar Ghimire. The first draft of the manuscript was written by Shyam Kumar Karki and Dipesh Kumar Ghimire and all authors commented on previous versions of the manuscript. All authors read and approved of the final manuscript.

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Data availability

The data that support the findings of this study are openly available in the "household risk and vulnerability survey, full panel 2016-2018" at https://doi.org/10.48529/MQYS-CP36.

Declarations

Ethics approval

This study used publicly available secondary data from the World Bank. The data were anonymized prior to public release, and no primary data collection involving human participants was conducted by the authors. Additionally, the principal author obtained permission from the World Bank to use the data for academic purposes on July 25, 2023.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing Interest

The authors declare no competing Interest.

Clinical trial number

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