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Remittances and Demographic Changes: A Multidimensional impact of remittances on Education, Health and Demography in BIMSTEC Countries

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Abstract

This study examines the impact of remittances on education, health and demography in BIMSTEC countries using the GMM technique and investigates the relationship between remittances, health, education and demography using a comprehensive dataset spanning from 1998 to 2022. The findings reveal that the inflow of workers' remittances exert a significant and positive influence on education expenditure. This suggests that migrant households allocate a proportion of remittance inflows towards investments in education, underscoring the pivotal role of remittances in fostering human capital formation. However, the impact of remittances on health outcomes appears less pronounced, exhibiting mixed effects across different health indicators. The study underscores the importance of disaggregating data to discern rural-urban differentials in education and health outcomes, a limitation that prompts calls for further research. This distinction is critically given in the heterogeneous nature of socio-economic conditions and access services across rural and urban settings. Future investigations could thus explore the differential impact of remittances on education and health outcomes, underpinning an inquiries into the allocation of remittances inflow within household and communities offering its causal impact in the decision-making process.

Keywords

Demography, Education, Health and Remittances

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Introduction

When migrants allocate a share of their earnings to support their families, whether through cash or goods, these transactions are termed as workers' or migrant remittances. This form of financial support has witnessed substantial growth in recent years, emerging as a pivotal source of foreign income for many developing nations. These remittances play a crucial role in enhancing the economic stability of recipient households and communities, often serving as a lifeline for basic needs such as food, shelter, education, and healthcare. Beyond meeting immediate necessities, remittances also contribute to long-term development by fostering investments in small businesses, infrastructure, health improvements, and education. Additionally, the flow of remittances can help alleviate poverty, reduce inequality, and enhance economic resilience in countries heavily reliant on migrant labour. This is called migration-development nexus (Xia *et al*., 2022). Remittances, or money sent by the migrant workers' in their home country is a matter of critical discussion in today's era. The inflow of workers' remittances is a key driver for human and economic growth. This chapter mainly focuses on the impact of remittances on education and health. The recent literature shows that both education and health are the two wheels of the economic growth which leads to highly efficient cum effective human capital formation and exhibits a positive effect of remittances on health and educational outcomes.

As, we know education and health play pivotal roles in the development of a country. Research shows that the health and education of parents, especially mothers, significantly impact the outcomes of their children, creating intergenerational benefits (Raju, 2022). Furthermore, the interaction between health and education determines labor productivity and development patterns in a country, with health investment being crucial for human capital formation (Sage, 2022).

The role of education and health in the development of a country is important as education enhances human capital, productivity and economic growth while health contributes to a productive workforce and overall well-being ultimately aiding in reducing the current account deficit (CAD) through improved human capital and productivity (Oguntomi & Igbinedion, 2021). Within this landscape, migrants and their families find themselves at the forefront of transformative change, witnessing significant increase in the family income alongside newfound access to education and healthcare services. However, the path to these rewards is often strewn with obstacles, as discrimination and arduous working conditions persist for immigrants hailing from low and middle-income countries, casting shadows over their aspirations for a better life abroad.

Yet amidst these challenges, a beacon of hope emerges for origin countries, as the promise of increased remittances, investments, and the transfer of skills and technology beckon towards a brighter future. Projections for 2022 paint a vivid picture: In India, remittances have emerged as a consistent and substantial source of foreign exchange, playing a pivotal

role in fortifying the country's balance of payments and contributing to macroeconomic stability. This chapter utilizing the Generalized Method of Moments (GMM) technique to analyze the impact of remittances on education and health in BIMSTEC countries would provide a valuable understanding of leveraging remittances for improved education and health outcomes.

Delving into the realm of global dynamics, the remittance market is supported by a multifaceted ecosystem comprising various entities but the total government expenditure on education and health is less than 5% in various BIMSTEC countries as shown in table 1 and will be discuss in the next section.

Trends of Remittances in BIMSTEC Countries

Remittances to low- and middle-income countries (LMICs) experienced a 3.8% growth in 2023, reaching an estimated $669 billion (Agyeman *et al*., 2023). This growth was supported by resilient labor markets in advanced economies and Gulf Cooperation Council (GCC) countries, enabling migrants to continue sending money home (Noureen, 2022). However, the latest Migration and Development Brief of the World Bank raises concerns about a potential decline in real income for migrants in 2024 due to global inflation and low growth prospects. The moderation in remittance growth in 2023 from the previous year highlights the need for attention to potential challenges faced by migrants in maintaining their income levels amidst economic uncertainties (Noureen, 2022). By region, remittance inflows grew for Latin America and the Caribbean (8%), South Asia (7.2%) (Idrissi, 2023), East Asia and the Pacific (3%), and Sub-Saharan Africa (1.9%) (Haughton & Ivey, 2023). Flows to the Middle East and North Africa fell for the second year, declining by 5.3% mainly due to a sharp drop in flows to Egypt (Oxford Analytica, 2023). Remittances to Europe and Central Asia also fell by 1.4% after gaining more than 18% in 2022 (Migration, 2022). India has topped the list of remittance recipient countries in the world, with a total of $125 billion sent by Indians living in different parts of the world to their families in India as per the Migration and Development Report June 2024 issued by the World Bank. According to this report Mexico, and China stand in second and third place with a remittance inflow of $67 billion and $50 billion as depicted in the 3-dimensional pie chart in Figure 1. As per the report, the total remittance flow to low- and middle-income countries amounted to $669 billion in 2023. While the average growth in low- and middle-income countries was 3.8%, remittance inflow grew 7.2% in South Asia. The total remittance inflow to South Asia was about $189 billion, of which the share of India was almost 66%. The United States, the United Kingdom, and Singapore are the most significant contributors to the remittance inflow in India. The money sent from these three countries amounts to 36% of the total remittance inflow in India. Gulf Cooperation Council (GCC) countries are the second most prominent contributors to India's remittance inflow, with the United Arab Emirates alone contributing 18% to the total inflow. The UAE is the second-largest contributing country to India’s remittances after the United States (Rahim, 2023).

Economies where remittance inflows represent substantial shares of gross domestic

product (GDP) – highlighting the importance of remittances for funding current account and fiscal shortfalls – are Tajikistan (48%), Tonga (41%), Samoa (32%), Lebanon (28%), and Nicaragua (27%). Based on the trajectory of weaker global economic activity, the growth of remittances to LMICs is expected to soften further to 3.1% in 2024. Driving the moderated forecast are slowing economic growth and the prospect of weaker job markets in several high-income countries. Additional downside risks include volatile oil prices and currency exchange rates, and a deeper-than-expected economic downturn in high-income countries (World Bank, 2024). According to the Remittances Prices Worldwide Database, World Bank remittance costs remain persistently high, costing 6.2% on average to send $200 as of the second quarter of 2023. Compared to a year ago, sending money to all regions was more expensive, with the Middle East and North Africa being the exception. Banks continue to be the costliest channel for sending remittances (with an average cost of 12.1%), followed by post offices (7%), money transfer operators (5.3%), and mobile operators (4.1%) (J. Ahmed *et al.*, 2021).

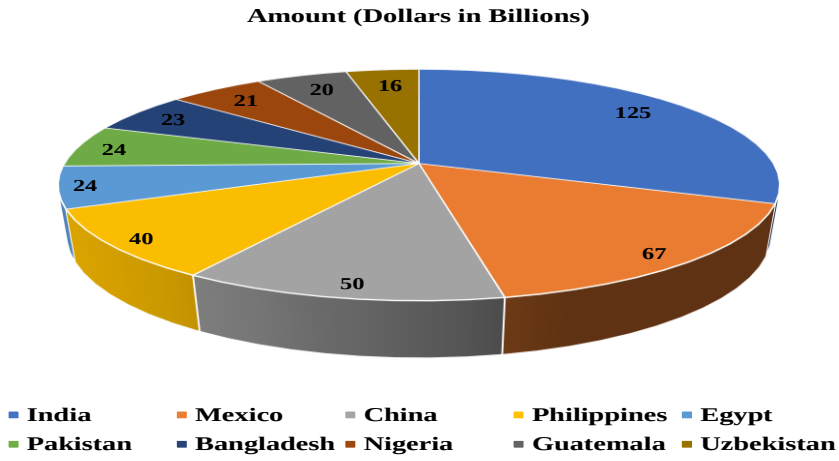


Figure 1 Top 10 Countries by Remittance Inflows (in Billions of Dollars)

Source: The World Bank

In the context of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), the region is re-evaluating its status and focusing on areas like trade, environment, security, agriculture, people-to-people contact, science, technology, innovation and connectivity to foster a stronger community (Chowdhury & Bhattacharjee, 2014). The globalization of health services is also evident in the BIMSTEC region, reflecting the growing cross-border delivery of health services and collaborative arrangements (Vogl, 2012).

The BIMSTEC countries include Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand. Economic integration within this regional trading bloc has shown benefits in increased economic growth, trade and investment. These countries face vulnerabilities that necessitate regional cooperation in disaster management and

environmental issues with a focus on aligning disaster management policies and establishing a permanent Disaster Management Authority (Ojha, 2022). Landlocked countries like Nepal and Bhutan within the BIMSTEC region encounter challenges related to trade diversification, trade deficits and high trade costs, necessitating interventions to enhance production, address barriers, and improve connectivity through infrastructure development and modernization. Bhutan, a member of BIMSTEC since 2004, relies on transit trade through India and sees the organization as a bridge to enhance trade connectivity with ASEAN countries (Chamlagai, 2022).

The main thrust/focus of the chapter is to study the impact of remittances on education and health outcomes in BIMSTEC countries. This section highlights the fact that remittances positively influence education outcomes by increasing educational expenditures and improving health outcomes by boosting healthcare spending in BIMSTEC countries as shown in Table 1. The interaction between health and education is crucial for human capital formation, productivity and economic growth, ultimately aiding in reducing the current account deficit. Remittances play a pivotal role in the economy by contributing significantly to GDP, creating employment opportunities, enhancing reserves, balancing payments and fostering socio-economic development. The BIMSTEC region emphasizes regional cooperation in various sectors such as trade, environment, security, agriculture and connectivity to foster a stronger community and address common challenges. Overall, the data highlights the role of remittances in contributing to economic development, improving human capital outcomes and fostering regional cooperation and integration in the BIMSTEC countries.

As, we know that BIMSTEC countries comprises of five south Asian countries namely Bangladesh, Bhutan, Nepal, India and Sri Lanka and two ASEAN countries i.e. Myammar and Thailand. Now, we are going to discuss in detail the recent trend and pattern of remittances in these countries. Remittances play a crucial role in the economy of Bangladesh by positively impacting the GDP of the country, create employment opportunities, increase reserves, balance payments, and enhance socio-economic development (Abbas *et al*., 2022). It also helps in poverty reduction by contributing to the balance of payments, boosting foreign exchange reserves, and bolstering national savings. The significance of remittances has grown in various macroeconomic indicators, including their contribution to the GDP of Bangladesh. These funds have had a positive impact on improving nutrition, living standards, housing, education, healthcare, social security, and investment opportunities for recipient households (Madan, 2019). Additionally, remittances act as a vital source of income for rural households, meeting consumption needs and providing security. The inflow of remittances has a substantial effect on household welfare, with a major portion utilized for healthcare, education, food, and savings (Mia & Ghosh, 2022).

In Bhutan, remittances play a quiet yet impactful role. According to the Royal Monetary Authority, Bhutan received Nu. 8.3 billion in remittances in 2022, equivalent to $111.2 million. This amount represented 39.2%

of the total Official Development Assistance (ODA) received in the same year, surpassing both Foreign Direct Investment (FDI) inflows of $5.7 million and tourism earnings of $88.7 million in 2021. This highlights the significant role of remittances as a valuable source of foreign exchange and income for the country. Remittances are used for various purposes, including payment for essentials like food, utilities, products and services as well as debt repayment thereby stimulating the local economy. Additionally, these funds are invested in higher education, skills development and healthcare costs. Moreover, remittances contribute to savings and the acquisition of fixed assets such as land, homes, construction projects, and business opportunities, fostering overall economic development in Bhutan (Younus, 2023).

India has indeed emerged as the top recipient of remittances globally, with USD 120 million in 2023 (Karmakar *et al*., 2022). The country has experienced a sharp rise in remittance inflows over the years, contributing significantly to its economic growth and development. With over 25 million Indian emigrants, the country benefits from their remittance transfers and knowledge exchange, which are crucial in various sectors like technology and biological sciences (Jijin *et al*., 2022). Remittances have become a stable source of foreign exchange inflow for India, surpassing other forms of capital flows like official development assistance and foreign direct investment (Tupe, 2022). The inflow of remittances has helped in promoting household welfare, health, and education, and narrowing the Current Account Deficit, making it a vital component of the country's Balance of Payment (Jadhav, 2021).

Roughly, around 3.1 million Myanmar nationals reside abroad as official expatriates. Their remittances in 2021 amounted to approximately $3.5 billion, constituting nearly 5% of Myanmar's GDP. When considering unofficial migrants, remittances might significantly increase, potentially reaching $8 billion or 13% of GDP. These funds are frequently utilized by families for essential needs such as education and healthcare, making a substantial contribution to improving education and health outcomes in Myanmar (Akee, 2021).

Remittances contribute to human capital investment by supporting education expenditures in Nepal. Nepali households allocate remittance funds to education, enhancing access to quality schooling. The effect of remittances on education varies significantly based on school quality within Nepal. Remittances lead to improved living standards, reduced poverty levels, and increased access to healthcare (Bansak *et al*., 2020). Additionally, families use remittance income to enhance health outcomes, including increased life expectancy and reduced infant mortality rates (Khanal, 2023).

Evidence from the rural sector of Sri Lanka demonstrates that labor migration and remittances have a notable impact on children's education within families. Remittances also positively influence health outcomes in Sri Lanka, leading to increased health expenditures and improved anthropometric measurements among children under five (De & Ratha, 2012). Furthermore, remittances are pivotal in Sri Lanka's economy by contributing significantly to its financial stability. They have effectively

covered a substantial portion of the trade deficit, thus bolstering the country's economic resilience. Notably, in 2020, remittance receipts exceeded the trade deficit, highlighting their crucial role in Sri Lanka's economic dynamics (Navodya, 2021).

For Thai migrant women residing in the Netherlands, sending remittances holds paramount importance as it helps them sustain connections with their families and communities back in Thailand. Moreover, the impact of remittances on health education in rural regions, such as District Rawalpindi (Acosta *et al*., 2007), underscores the necessity for heightened awareness and educational efforts to attain the Sustainable Development Goals by 2030. Remittances in Thailand are rooted in altruism and serve as a vital source of income for low-income households, helping them overcome financial shortages (Osaki, 2003).

Remittance flows to South Asia in 2022 exceeded expectations, reaching a total of $176 billion, which was nearly $13 billion higher than forecasted in November 2022. This increase was largely driven by remittance flows to India, which surpassed the $100 billion milestone by $11 billion. Remittances to South Asia as a whole grew at a rate of 12.2% in 2022, nearly double the rate observed in 2021, except for Bangladesh, Pakistan, and Sri Lanka (Chandra, 2023). Although remittances accounted for only 4% of South Asia's GDP in 2022, there was significant variation across countries. For instance, in Nepal, which is among the top 10 countries with the largest share of remittances, remittances constituted 23.1% of GDP in 2022. In comparison, the share was 7.9% in Pakistan, 5.1% in Sri Lanka, and 4.7% in Bangladesh. In India, the largest recipient globally, remittances represented 3.3% of GDP in 2022. The 8% increase in remittances in 2021 and the historic 24.4% rise in 2022 in India contributed to remittances peaking at $111 billion, accounting for 63% of South Asia's total remittance flows (Chandra, 2023).

Narayan *et al*. (2011) find evidence that remittances contribute to inflation in developing countries, with a more pronounced effect in the long run. Additionally, the findings suggest that remittances play a role in driving growth in developing countries and policymakers should consider this when formulating monetary and fiscal policies (Narayan *et al*., 2011). The prime focus of this chapter is to study the relationship between remittances, education and health in BIMSTEC countries using the System GMM technique. It finds that remittances and education are positively correlated with capital formation playing a significant role in this relationship. The use of the System GMM estimator improves the estimation of the impact of education on growth by considering cross-country variation in attainment of different education levels. Table 1 shows trends of government expenditure on education and health in BIMSTEC countries where column 3 shows the average expenditure of four consecutive years i.e. 2011-14, column 4 shows the average expenditure from 2015-18 and column 5 shows the average expenditure from 2019-22. Based on the table below we can infer that Bhutan, Nepal, India and Thailand approximately spends 3-4 percent of their total government expenditure on Education and in contrast only 2.5 percent (approx) on health.

Table 1 Trends of Government Expenditure on Education and Health in BIMSTEC countries

Country Name	Indicator	Average(2011-14)	Average(2015-18)	Average(2019-22)
Bangladesh	Government expenditure on education, total (% of GDP)	2.06	1.90	1.81
Bangladesh	Government health expenditure (% of GDP)	0.54	0.55	0.50
Bhutan	Government expenditure on education, total (% of GDP)	5.51	6.34	6.46
Bhutan	Government health expenditure (% of GDP)	2.50	2.63	3.03
Nepal	Government expenditure on education, total (% of GDP)	3.52	3.49	3.83
Nepal	Government health expenditure (% of GDP)	0.80	1.01	1.33
India	Government expenditure on education, total (% of GDP)	3.91	4.21	4.46
India	Government health expenditure (% of GDP)	0.90	0.95	1.03
Sri Lanka	Government expenditure on education, total (% of GDP)	1.65	2.48	1.42
Sri Lanka	Government health expenditure (% of GDP)	1.59	1.66	1.68
Myanmar	Government expenditure on education, total (% of GDP)	1.57	2.22	2.14
Myanmar	Government health expenditure (% of GDP)	0.58	0.85	0.74
Thailand	Government expenditure on education, total (% of GDP)	4.04	3.57	2.94
Thailand	Government health expenditure (% of GDP)	2.70	2.78	2.93

Source: World Bank

The rest of the chapter is organised in the following sections. The next section provides the brief review of recent literature on the impact of remittances on education and health in BIMSTEC countries. Section 4 focus on the model specification and the theoretical background. Section 5 analyses the empirical results using GMM technique and section 6 concludes the study.

Brief Review of Literature

The phenomenon of financial transfers made by migrants to their home countries is a matter of great interest as these transfers play a crucial role in the economies of regions like South Asia, Sub-Saharan Africa, Latin America, and the Caribbean (Grabel, 2014). In 2012, Zhunio *et al*. conducted a study to examine how international remittances impact educational and health outcomes across 69 low- and middle-income nations. Their research revealed a substantial positive correlation between remittances and advancements in primary and secondary school attainment. Additionally, they found noteworthy improvements in life expectancy and reductions in infant mortality rates associated with increased remittance flows (Zhunio *et al*., 2012).

As mentioned earlier, that the remittance behavior is influenced by family needs, household economic status, and even the culture of remittances in the migrants' villages. Furthermore, remittances have been shown to impact financial sector development by increasing bank deposits and revenue for financial institutions (Githaiga and Kabiru, 2014). Recent trend in literature signifies that despite the complexities surrounding remittance flows, they remain a significant factor in global economic dynamics, affecting both individual households and entire economies.

Remittances have a significant impact on education and health outcomes in both India and BIMSTEC nations. In India, remittances have shown a positive relationship with economic growth (Zhunio *et al*., 2012) and they contribute to household welfare, health and education, promoting better living standards (Karmakar *et al*., 2022). Similarly, in BIMSTEC nations, remittances play a crucial role in improving primary and secondary school attainment, increasing life expectancy, and reducing infant mortality (Orozco & Ellis, 2014). The financial activities of migrants and their families demonstrate an active capacity to build assets through remittances, impacting national economies and financial systems positively (Shafiq and Gillani, 2018). Overall, remittances not only enhance the quality of life, reduce child labor, and provide knowledge transfer but also serve as a policy intervention to improve child health.

According to Ahmad *et al*. in 2023, Bangladesh stands as one of the world's leading recipients of remittances. Their research indicates that as remittance inflows into Bangladesh increase, there is a corresponding decrease in the likelihood of children aged 6-18 dropping out of education. This finding highlights the positive impact of remittances on education outcomes in Bangladesh (F. Ahmed *et al*., 2023). Bezon Kumar 2019 conducted a study, based on data from 396 households in Bangladesh that examines the impact of international remittances on education and health. Using a linear regression model with the OLS method, it reveals that remittances hurt education spending (decreased by Taka 1020.67) but have a positive impact on health spending (increased by Taka 4817.39). These insights highlight trade-offs within remittance-receiving households, crucial for policymakers and researchers to understand how remittances affect household welfare, education, and health dynamics (Kumar, 2019). In their 2017 study, Wadood *et al*. find that while both internal and external remittances in Bangladesh significantly reduce poverty and increase consumption expenditure, the impact is notably higher for external remittances. However, they observe no impact of remittances on household expenditures for education and healthcare (Wadood & Hossain, 2017). Barai (2012) reveals that remittances have significantly improved social and economic indicators such as nutrition, living conditions, housing, education, healthcare, poverty reduction, social security and investment activities within recipient households. Moreover, the relative importance of remittances has grown concerning various macroeconomic variables, contributing notably to GDP. Bangladesh has effectively managed to avoid significant imbalances in its Balance of Payments (BOP) current account, despite facing persistent merchandise trade deficits. Furthermore, the export tradable sector has remained resilient

against potential Dutch Disease effects resulting from remittances (Barai, 2012). Raihan *et al*. (2022) demonstrate that remittances have a positive and significant impact on various spending categories in Bangladesh, except for education and investment. Specifically, households receiving remittances allocate a smaller fraction of their total spending towards food and investment compared to non-remittance-receiving households. While remittances positively affect the budget shares for health, housing, and land expenses, their impact is insignificant for education expenditures and the consumption of durable goods (Raihan *et al*., 2022). Al-Islam *et al*. (2012) findings indicate a positive correlation between children's school enrollment and remittances, as anticipated. Additionally, the education levels of parents significantly impact children's school enrollment positively. Al-Islam *et al*. (2012) propose that besides the existing incentives for migrant workers sending remittances, governments could introduce modified or additional incentives to boost children's enrollment from remittance-receiving families. Moreover, addressing lower enrollment rates among children in urban areas, male children, and single-child households requires policymakers to develop new intervention programs while educating the public about the advantages of education acquisition *(*Al-Islam *et al*., 2022).

While formal research on the impact of remittances on the education and health of Bhutan is lacking, anecdotal evidence suggests that remittances are primarily utilized in three key areas: household consumption, human capital development, and savings/investments. In household consumption, remittances are commonly used to cover essential expenses such as food, utilities, products, services, and debt repayment. The human capital development in which the remittances often contribute to investing in higher education, skills development and healthcare costs. In savings and investments, the remittance recipients may allocate funds towards savings and acquiring fixed assets like land, homes, constructions, or business opportunities. These investments can have lasting economic impacts by creating employment, fostering economic growth, and reducing poverty (Younus, 2023). The personal remittances received by Bhutan in 2022 amounted to $95,956,454 in current US dollars (*Personal Remittances, Received Bhutan: The World Bank*, 2022). The remittance inflows to GDP for Bhutan are represented as a percentage over the years from 2005 to 2020. In 2005, remittance inflows to GDP were negligible at 0.00%. There is a noticeable increase starting from 2006 when remittance inflows to GDP stood at 0.26% and continued to rise steadily until 2009 (0.39%). A significant jump was observed in 2010, reaching 0.53% and continuing to increase annually. The trend shows continued growth, with fluctuations, reaching its peak in 2020 at 3.46%, indicating a substantial increase in remittance inflows relative to GDP over the years. Thus, the data shows the growing importance of remittances in the economy of Bhutan, as seen in the increasing percentage of remittance inflows to GDP from 2005 to 2020. This trend suggests that remittances have played a significant role in the economy of Bhutan during this period (*Remittance Inflows to GDP for Bhutan*, 2022).

Attempts have been made to revealed that the remittances have a positive impact on total food expenditure in India, particularly increasing spending on protein-rich foods such as meats, eggs, pulses, vegetables and fruits (Sangwan *et al*., 2023). They measure food diversity using data from 2005 to 2012, utilizing metrics Household Dietary Diversity Score, Shannon Index, and Simpson Index. The findings suggest that remittances serve as a mechanism for households to enhance their food security by improving both the quantity and diversity of food available to them (Sangwan & and Tasciotti, 2023). Bhupesh Gopal Chintamani and Lalitagauri Kulkarni (2023) demonstrate the significance of remittance inflows as a crucial source of funding for rural households in India. Their research is based on primary data collected from villages in the Ratnagiri District of Maharashtra, India. The study employs logit and probit models to analyze the data, revealing a positive correlation between inward remittances and the economic welfare and subsistence of recipient households. Interestingly, the study also uncovers a strong negative relationship between the education levels of household members and emigration patterns, suggesting a potential impact of education on migration decisions within these communities (Chintamani and Kulkarni, 2023).

Indian remittances, as highlighted by Jo Joseph in 2023, reveal the status of India as the largest recipient with over $80 billion in 2020 and a migrant population exceeding 15 million. The study delves into socio-economic dimensions, regional variations and historical trends of international remittances in India. It emphasizes the significant impact of Gulf migration on Indian households, particularly in Kerala, supporting various aspects like savings, investments, education and small businesses. The rise of technology and social platforms has facilitated migration processes and information dissemination. However, challenges such as migration barriers for the poorest and dependency culture associated with remittances persist. Cooperation between the public and private sectors is crucial for optimizing the potential of migration-related developments (Joseph, 2023).

Khin Soe Kyi 2021 surveyed 494 respondents from left-behind families by using a pre-tested structured questionnaire. Khin Soe Kyi 2021 found that both education and health and the perception of economic indicators improved significantly. Family perception of social indicators has significantly become better, however psychological problems are found to be worse after migration (Khin Soe, 2021). Ananta Raj Dhungana and Dipendra Pandit (2014) conducted interviews with 147 households in Lekhnath, Nepal and discovered that overseas remittances have led to a qualitative improvement in children's education and health status (Dhungana & Pandit, 2014), according to the Kul Kapri and Stuti Jha investigation which reveals a positive and significant impact of remittances on healthcare expenditure. Their analysis indicates a 0.099% rise in healthcare expenditure for every 1% increase in total remittances. Moreover, for earned remittances (received from a household member), this effect increases to 0.189%. The study also highlights variations in healthcare spending behavior between remittance-receiving households with at least one migrant family member and those without any migrant

members (Kapri & Jha, 2020). Bansak *et al*. (2015) utilized the 2010 Nepal Living Standards Survey III to investigate the impact of remittances on household expenditures related to human capital investment. Their findings suggest that remittances do contribute to human capital investment, but the extent of this contribution varies significantly based on the quality of schools within Nepal. Interestingly, the study highlights that internal remittances (from household members migrating within the country) have a more significant impact on education compared to external remittances. This could be attributed to a higher value placed on Nepali education by internal migrants, in contrast to the education needed for foreign job opportunities by migrants abroad (Bansak *et al*., 2015). Dharmadasa *et al*. (2029) gathered data from the Department of Census and Statistics in Sri Lanka and analyzed it using probit models. Their results indicate that the school enrollment of children left behind increases when there is an internal or international migrant in the family. Furthermore, they found that the receipt of local remittances significantly promotes the school enrollment of children in the rural sector, highlighting the positive influence of remittances on education outcomes in these areas (Dharmadasa *et al*., 2019).

Since worker' migration is a universal phenomenon in all dimensions and it exhibits the positive and significant impact on education and health in the BIMSTEC countries. It plays a significant role in determining the economic growth and the wellbeing of its citizens. However, it does not cater the rural-urban differentials in education and health, a limitation that prompts calls for further research.

Model Specification and Theoretical Background

Based on the available literature, we consider a set of macroeconomic variables to investigate the impact of remittances on education and health in BIMSTEC countries. For the purpose of the present study we have frame two models where the first model will address the impact of remittances on Education in BIMSTEC countries followed by the impact of remittances on Health in BIMSTEC countries using GMM technique. However, for the in-depth analysis overview of model specification is depicted below in figure 2.

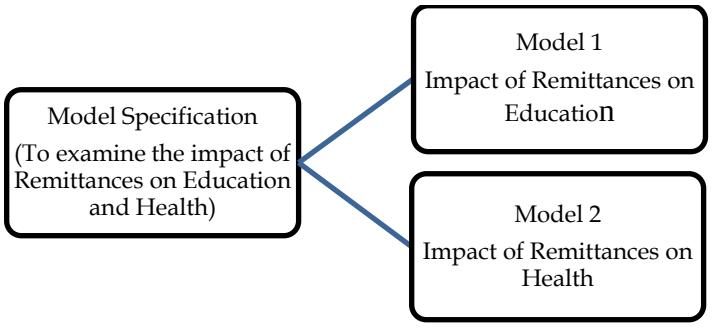


Figure 2 Overview of Model Specification

Model 1: Impact of Remittances on Education in BIMSTEC Countries

Based on the conceptual framework outlined in the preceding section, which furnishes the theoretical rationale for incorporating lagged levels of total years of education as an additional regressor, we adopt a dynamic panel specification. Given the relatively small size of our panel dataset, our preference is to utilize the Arellano and Bond (AB, 1991) GMM estimator, the Arellano and Bover (1995) estimator, and the Blundell and Bond (1998) system GMM estimator. The proposed model is structured as follows:

$$edu_{i,t} = \alpha\, edu_{i,t-1} + \beta X'_{i,t-1} - \psi gremx_{it} + \nu_{i,t} + \varepsilon_{i,t.}$$
$$i= 1,\ldots\ldots, N;\ t = 1,\ldots\ldots,T \qquad (1)$$

where, equation (1) represents $edu_{i,t}$ as the total years of education for individual i at time t; $edu_{i,t-1}$ denotes the lagged total years of education for individual i at time t-1 ; $X_{i,t-1}$ represents a vector of other explanatory variables for individual i at time t-1; *gremxit* refers to the amount of international remittance received by individual i at time t; $\alpha, \beta, and\ \psi$ are the coefficients representing the effects of lagged education, other explanatory variables, and international remittance; $V_{i,t}$ represents individual-specific fixed effects and $\epsilon_{i,t}$ is the error term.In the first model of the empirical analysis, we focus on the impact of remittances on education in BIMSTEC countries. Table 2 presents a comprehensive overview of the variables along with their notations, measurements, sources, and expected signs about the dependent variable. Each variable represents a distinct aspect of the educational and socio-economic landscape, offering insights into potential factors influencing the dependent variable. Education (Edu) is quantified by the percentage of secondary school enrollment relative to the gross population, reflecting the accessibility and participation in secondary education. This variable's expected sign is left unspecified, suggesting that its impact on the dependent variable may vary based on the specific context and analytical framework (Fernandez *et al*., 2019). Remittances (Rem) denote the percentage of personal remittances received about GDP, highlighting the significant role of external financial inflows from migrant workers. The expected positive sign indicates that higher remittance inflows are anticipated to positively influence the dependent variable, potentially enhancing educational outcomes or the socio-economic conditions. Gross Capital Formation (Gcf) represents the proportion of GDP allocated to gross capital formation, reflecting investment in physical infrastructure and productive assets. With an expected positive sign, higher levels of gross capital formation are expected to contribute positively to the dependent variable, indicating potential economic development and resource allocation towards educational infrastructure (Fayissa *et al*., 2013). Government Expenditure (Gexp) pertains to government spending on education as a percentage of total government expenditure reflecting investment in educational resources and facilities. The unspecified expected sign suggests that the impact of government expenditure on the dependent variable could vary based on the specific policy priorities and allocation strategies of the government. The Student-Teacher Ratio (Str) measures the pupil-teacher ratio at the secondary level, indicating the extent of educational resource allocation and as a percentage of the population, providing insights into the prevalence of good standard of living within

the country. The positive expected sign implies that the relationship between per capita income and the dependent variable may exhibit varying directions based on the socioeconomic context and policy interventions. Lastly, parental education is another control variable measure by the proxy variable of labor force with basic education as a percentage of total working age population with basic education with a positive expected sign.

Table 2 Data Variables and Description of Model 1

Variable (I)	Measurement (II)	Notation (III)	Source (IV)	Expected Sign (V)
Education	School enrollment, secondary (% gross)	Edu	WDI	+/-
Remittances	Personal remittances received (% of GDP)	Rem	WDI	+
Gross Capital Formation	Gross capital formation (% of GDP)	Gcf	WDI	+
Student-teacher Ratio	Pupil-teacher ratio, secondary	Str	WDI	+
Government Expenditure	Government expenditure on education, total (% of government expenditure)	Gexp	WDI	+
Per Capita Income	GDP Per Capita	Pci	WDI	+
Parental Education	Labor force with basic education (% of total working-age population with basic education)	P_Edu	WDI	+

Note: WDI stands for World Development Indicator (provided by World Bank)

Model 2: Impact of Remittances on Health in BIMSTEC Countries

Similar to the model 1, now we will study the impact of remittances on Health in BIMSTEC countries using the the Blundell and Bond (1998) system GMM technique and the model specification is as follows:

$$hel_{i,t} = \alpha\, hel_{i,t-1} + \beta X'_{i,t-1} - \psi grem x_{it} + \nu_{i,t} + \varepsilon_{i,t.} \quad i = 1,\ldots\ldots, N;\ t = 1,\ldots\ldots,T. \qquad (3)$$

where, $hel_{i,t}$ stands for total life expectancy at birth of country i at time t; grem stands for personal remittances received as a percentage of GDP henceforth remittance growth; X is a

vector of core explanatory variable used to model health, apart from remittances; ν is country-specific effects and ε is the error term.

Additionally, Table 3 depicts the notations, measurement, sources and expected signs of different macroeconomic variables impacting the total inflow of remittances on health in BIMSTEC countries with each variable referring the different measures of health indicators and their expected relationships. The total life expectancy at birth in years is the prominent determinant of health indicator explaining the relative importance of investments in health care and other factors impacting health of an individual and it shows a positive relationship with the personal remittances (Frank *et al*., 1994). The comprehensive overview of other variables such as *Con* as a final household consumption level as a percentage of GDP, *Exp* as a measure of total domestic general government health expenditure and *Wat* is representing the total percentage of population using basic handwashing facilities including soap and water is also discussed in detailed.

Table 3 Data Variables and description of Model 2

Variable (I)	Measurement (II)	Notation (III)	Source (IV)	Expected Sign (V)
Health	Life expectancy at birth, total (years)	Hel	WDI	+
Remittances	Personal remittances received (% of GDP)	Rem	WDI	+
Household Consumption	Households and NPISHs final consumption expenditure (% of GDP)	Con	WDI	+
Gross Domestic Product	GDP per capita growth (annual %)	Gdp	WDI	+/-
Expenditure on Health	Domestic general government health expenditure (% of general government expenditure)	Exp	WDI	-
Clean Water	People with basic handwashing facilities including soap and water (% of population)	Wat	WDI	+

Note: WDI stands for World Development Indicator (provided by World Bank

Data, Methodology and Empirical Results

Data Collection

The empirical analysis conducted in our study is based on annual data spanning the period from 1989 to 2023. The data was collected from the World Development Indicators (WDI) a subsidiary of World Bank. Specifically, our focus was on countries belonging to the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC). These countries include Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand. We utilized this extensive dataset to explore various economic and developmental aspects within the BIMSTEC region. Our analysis covered the impact of remittance on Education and Health in BIMSTEC Countries. By leveraging the rich dataset spanning over two decades, we aimed to provide comprehensive insights into the trends, patterns, and relationships affecting these countries. The inclusion of data from multiple years allowed us to capture long-term trends, changes, and dynamics in the region.

Methodology

The Generalized Method of Moments (GMM), introduced by Lars Peter Hansen in 1982, is a statistical estimation technique widely used in econometrics and other fields. It offers a flexible approach to estimating parameters in models where classical linear regression assumptions may not hold. The core idea behind GMM is to specify a set of moment conditions based on the data and model structure. These moment conditions represent equations that capture key features of the data, such as means, variances, covariances, or higher-order moments. The parameters of interest are then estimated by finding values that make the difference between sample moments and model-implied moments as small as possible. One of the main advantages of GMM is its ability to handle various types of data issues, including endogeneity, heteroscedasticity, autocorrelation, and measurement errors. By specifying appropriate moment conditions, GMM allows researchers to account for these complexities and obtain consistent and efficient parameter estimates. GMM estimation involves selecting a set of instrumental variables, which are used to construct the moment conditions. These instruments should be correlated with the endogenous variables of interest but uncorrelated with the error term in the model. The GMM estimator then optimizes a criterion function to find the parameter values that best fit the moment conditions (Hansen, 2010).

Arellano-Bond estimator was proposed by Manuel Arellano and Stephen Bond in 1991. This estimator is widely used by empirical researchers for dynamic panel models with fixed effects and endogenous regressors. It addresses the issue of endogeneity and serial correlation in panel data by exploiting the presence of lagged dependent variables as instruments. The Arellano-Bond estimator is specifically tailored for dynamic panel data models, where both time-series and cross-sectional variation are present. The Arellano-Bond estimator uses lagged differences of the dependent variable as instruments for the first-differenced equation. The Arellano-Bond estimator relies on orthogonality conditions derived from the differenced equations. These conditions ensure that the instruments used in the estimation are uncorrelated with the error term, which is essential for obtaining consistent and efficient parameter estimates.

One of the key contributions of the Arellano-Bond estimator is its ability to correct for serial correlation in panel data models. By first differencing the data, the estimator effectively removes the autocorrelation in the error term, leading to more efficient estimation results (Doornik *et al.*, 2002).

In their seminal work, Arellano and Bover introduced an advanced linear GMM estimator tailored for dynamic panel data models. Their pioneering innovation involved employing lagged differences of the dependent variable as instruments for equations in levels, alongside the conventional use of lagged levels of the dependent variable as instruments for equations in first differences. This novel approach aimed to overcome the shortcomings of the standard first-differenced GMM estimator, which often exhibits finite-sample bias and reduced precision, particularly in situations where the autoregressive parameter is relatively large and the number of time series observations is relatively limited (Blundell & Bond, 1998).

Blundell and Bond (1998) expanded upon the groundwork laid by Arellano and Bover, proposing a system estimator that amalgamates moment conditions. Specifically, they employed lagged differences as instruments for the level equation and lagged levels as instruments for the differenced equation. Their method enhanced the properties of the standard first-differenced GMM estimator, particularly in scenarios where weak instruments were a concern. Monte Carlo simulations showcased the significant efficiency gains of this extended GMM estimator over the typical first-differenced GMM estimator and even the non-linear GMM estimator based on moment conditions. These estimators have emerged as invaluable tools for analysing dynamic panel data, enabling researchers to tackle endogeneity issues and refine the precision of parameter estimates across various economic applications (Blundell & Bond, 1998).

Anderson and Hsiao (1982) suggested that earlier period lags can be used as Instrumental variables (Anderson & Hsiao, 1982).

$$\Delta y_{it} = \beta(\Delta y_{it-1}) - \delta(\Delta x_{it}) + (\Delta \varepsilon_{it}) \quad (5)$$

They proposed using either the first difference or level of the second lag of the dependent variable, that is (Δy_{it-2} or y_{it-2}) as an instrument for Δy_{it-1}.

Another problem with Arellano and Bond (1991) showed that the Anderson and Hsiao estimator delivers consistent but not efficient estimates of the parameters in the model. This is because the Instrumental Variable exploits all the. Available moments condition. It means Anderson and Hsiao estimators may be consistent but not efficient.

For the system GMM estimator, we make a system of the following two equations:

$$y_{it} = \alpha + \beta y_{it-1} - \delta x_{it} + \mu_{it} + \varepsilon_{it.} \quad \text{(At level)} \quad (6)$$

$$\Delta y_{it} = \beta(\Delta y_{it-1}) - \delta(\Delta x_{it}) + (\Delta \varepsilon_{it}) \quad \text{(At Difference)} \quad (7)$$

The advantage of using the system GMM estimator lies in its capability to incorporate a greater number of instrumental variables (IVs). In the original (level) equation, lagged differences are introduced as IVs, while lagged levels serve as IVs for the differenced

equation. Moreover, the system GMM is specifically tailored for dynamic short panels, and the introduction of additional instruments can significantly enhance efficiency and facilitate the transformation of instruments to ensure their uncorrelatedness with fixed effects.

Empirical Results

Model 1: Impact of Remittances on Education in BIMSTEC Countries

The graph in Figure 3 is a scatter plot showing the relationship between the independent variable, Rem, and the dependent variable, Edu. Visually, the data points seem to be clustered around a central area, suggesting a non-uniform distribution. The graph exhibits a positive correlation. This means as Rem values increase, Edu values generally tend to increase as well. The data points form a tight cloud along a diagonal line, which suggests a strong positive correlation. An elongated cloud tilted upwards indicates a moderate positive correlation. A scattered pattern with no clear diagonal trend suggests a weak or even no correlation. Thus, data points show a positive correlation, which means that as the Rem value increases, the Edu value also tends to increase. There is a cloud of points, however, so the relationship is not perfectly linear. This means that Education may be influenced by other factors besides Remittances.

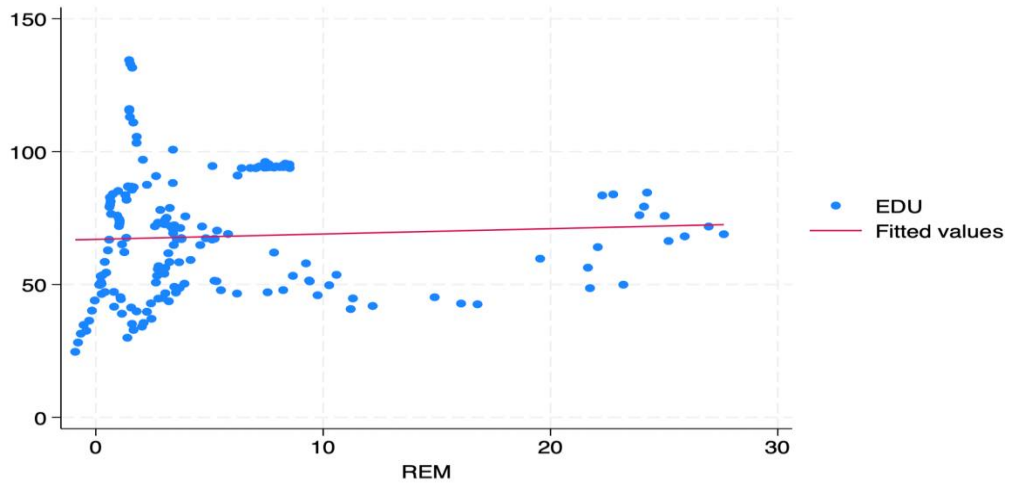


Figure 3 Scatter plot of Education and Remittances

The graph in figure 4 shows variability in the Edu values for a given Rem value for the BIMSTEC countries. This indicates that the factors other than Rem likely influence Edu. The points are tightly clustered, suggesting minimal influence from other factors and are spread out widely. By looking at the scatter plot, we can observe the general trend of positive association between remittance (Rem) and education (Edu) across all the countries BIMSTEC countries namely Bangladesh, Bhutan, Nepal, India, Sri Lanka, Myanmar and Thailand. This means that as the remittance values tend to increase, the education values also generally show an upward trend. However, it's important to remember that this is just a general observation and for in-depth analysis we will use different econometric

tools to check it variability/feasibility as mentioned in the methodology of this chapter. This also indicates that the other factors besides remittances likely to play a significant role in influencing educational levels in BIMSTEC countries.

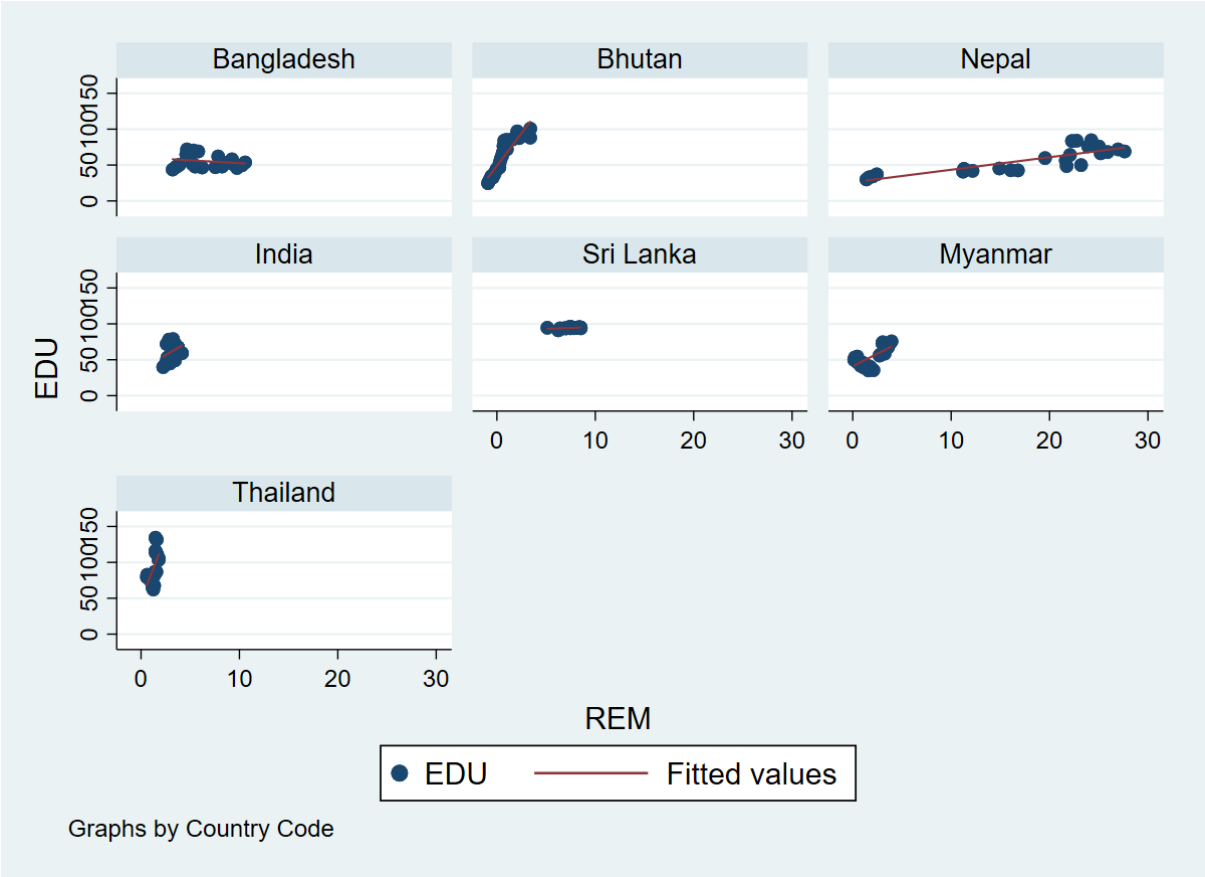


Figure 4 Country-wise best-fitted line depicting the impact of remittances on education across BIMSTEC Countries

To estimate the impact of remittances on education in BIMSTEC countries, we will utilize panel data analysis. The table 4 presents the descriptive statistics of key variables across BIMSTEC countries, including Education (Edu), Remittances (Rem), Gross Capital Formation (Gcf), Government Expenditure (Gexp), Student-Teacher Ratio (Str), Per Capita Income (Pci) and Parental Education (P_Edu). The mean values indicate that the average school enrollment (% gross) is approximately 77.02%, while the mean percentage of personal remittances received (% of GDP) is 4.60%. The mean Gross Capital Formation (% of GDP), Government expenditure per student (% of GDP/Capita), government expenditure (gexp), Per capita income (% of population), and Parental education are approximately 33.69, 14.18, 2699.25, and 34.58 respectively. The standard deviations show the degree of dispersion around the mean for each variable. For instance, the standard deviation of Education is 22.08, indicating considerable variability in school enrollment percentages across BIMSTEC countries. The maximum and

minimum values reveal the range of each variable. For example, the maximum school enrollment percentage is 126.04, while the minimum is 20.45. Skewness measures the asymmetry of the distribution. Positive skewness indicates that the distribution is skewed to the right, while negative skewness implies a leftward skew. Remittances exhibit positive skewness (2.596), suggesting a rightward skew in their distribution. Kurtosis measures the tailedness of the distribution. Higher kurtosis values indicate heavier tails compared to a normal distribution. Variables like Remittances and government Expenditure exhibit relatively high kurtosis, implying heavier tails in their distributions. The Jarque-Bera test assesses the normality of the data distribution. A p-value less than 0.05 indicates that the data is not normally distributed. In this case, the p-values more than 0.05, suggesting that they are normally distributed. In addition, table 5 shows that except per capita income (pci) all variables are moderately correlated with the secondary school enrolment ratio (edu) and except per capita income (pci) and parental education (P_edu) all other variables are negatively correlated with secondary school enrolment ratio.

Table 4 Descriptive Statistics

Variables	Edu	Rem	Gcf	Str	Gexp	Pci	P_Edu
Mean	77.027	4.606	33.698	1021409	14.180	2699.249	34.578
Std. Dev.	22.078	4.477	12.386	1608146	3.344	1921.702	7.256
Maximum	126.036	24.250	67.790	2379.000	22.833	7605.697	45.839
Minimum	20.454	0.000	16.459	2379.000	5.039	283.054	20.683
Skewness	0.087	2.596	1.414	1.505	-0.169	0.967	-0.003
Kurtosis	2.971	11.430	3.752	3.471	3.547	3.123	1.828
Jarque-Bera	0.074	232.780	20.351	22.050	0.981	8.927	3.262
Probability	(0.963)	(0.000)	(0.000)	(0.000)	(0.612)	(0.012)	(0.196)

(i)See Table 2 for details and definitions of variables. (ii) Values in (#) are p values.

Table 5 Correlation Matrix

	Edu	Rem	Gcf	Str	Gexp	Pci	P_Edu
Edu	1.000						
Rem	-0.083	1.000					
Gcf	-0.117	-0.317	1.000				
Str	-0.041	-0.212	0.317	1.000			
Gexp	-0.157	-0.147	-0.242	0.078	1.000		
Pci	0.842	-0.315	-0.071	-0.057	-0.289	1.000	
P_Edu	0.592	0.235	0.363	0.055	-0.662	0.722	1.000

In order to examine the effect of migrant's remittances on education we first investigate the stationarity of variables included in the study. Table 6 presents the results of stationarity which suggest that all the variables are stationary either at the level or at the first difference. For all variables, the Levin-Lin-Chu (LLC) test at the level and at the first difference yields p-values of 0.05, indicating the rejection of the null hypothesis of a unit root, indicating that the variables are stationary. We have also calculated the results at both intercept (C) and intercept with trends(C&T) for in-depth analysis. The variable Gexp and P_Edu are significant at both levels and the first difference but rem, gcf

and pci is only significant at the first difference. The critical values at 1%, 5%, and 10% significance levels further support these findings. Consequently, we have also shown the results of Im-Pesaran-Shin (IPS) test indicate that all variables exhibit stationarity either at levels or at first difference which will be subsequently used for further analysis.

Table 6 Results of stationarity tests

Variable	LLC				IPS			
	Level		First Difference		Level		First Difference	
	C	C&T	C	C&T	C	C&T	C	C&T
Edu	-0.610	0.259	0.459	1.462	2.349	2.348	-3.809***	-2.266**
	(0.271)	(0.602)	(0.677)	(0.928)	(0.991)	(0.991)	(0.000)	(0.011)
Rem	-0.606	0.554	-2.815**	-0.980	0.586	1.246	-6.847***	-6.122***
	(0.272)	(0.710)	(0.002)	(0.164)	(0.721)	(0.893)	(0.000)	(0.000)
Gcf	-2.672**	0.260	-3.718***	-3.752***	-2.191**	0.334	-4.899***	-3.917***
	(0.003)	(0.603)	(0.000)	(0.000)	(0.014)	(0.631)	(0.000)	(0.000)
Str	-1.169	-3.800***	1.577	3.529	-0.712	-1.137	-1.001	0.313
	(0.121)	(0.000)	(0.943)	(0.999)	(0.238)	(0.128)	(0.158)	(0.623)
Gexp	-1.741**	-2.788***	-5.923***	-4.684***	0.853	0.463	-3.385***	-1.268
	(0.040)	(0.002)	(0.000)	(0.000)	(0.803)	(0.679)	(0.000)	(0.102)
Pci	3.417	-0.907	-3.417***	-2.604***	5.839	1.216	-5.465***	-5.227***
	(0.999)	(0.182)	(0.000)	(0.005)	(1.000)	(0.888)	(0.000)	(0.000)
P_Edu	-1.294*	-1.851**	-2.973***	-1.893**	-1.460*	-2.401***	-6.927***	-5.262***
	(0.098)	(0.032)	(0.002)	(0.030)	(0.072)	(0.008)	(0.000)	(0.000)

(i)LLC stands for Levin-Lin-Chu test and IPS stands for Im-Pesaran-Shin test (ii)C denotes constant and C&T denotes constant with trends
*(iii) ***,**, and * denotes significance at 1%, 5%, and 10%, respectively*

As, the above table provides the results of descriptive statistics now we will present the estimation results in table 7 using the Pooled OLS, Random Effects, Fixed Effects with model 1 excluding the parental income (P_Edu) as one of the control variable and in model 2 we have excluded per capita income (Pci) as one of the control variables. In addition to this table 6 provides differenced GMM, and System GMM estimation results for both the models. In the Pooled OLS, Random Effects, and Fixed Effects models, the coefficient for personal remittances received (% of GDP) is statistically significant at a 1% level, indicating a positive association with school enrollment. However, in the Differenced GMM and System GMM models, while the coefficient remains positive, it is only statistically significant at the 10% and 5% levels, respectively. The coefficients for personal remittances, gross capital formation, student-teacher ratio, per capita income and parental education are statistically significant across one or two models, indicating their influence on secondary enrollment rates. All the variables have positive coefficients, suggesting that higher levels of these variables are associated with increased school enrollment. In contrast, the student-teacher ratio and governmental expenditure has a negative coefficient, indicating that a higher ratio is associated with lower school enrollment rates. The intercept are statistically significant in model 1, suggesting their

importance in explaining variations in school enrollment rates over time and across countries. The models exhibit varying levels of goodness of fit, with R-squared values ranging from 0.534 to 0.946. The Pooled OLS and Random Effects models have higher R-squared values, indicating better explanatory power compared to the Fixed Effect model. The Hausman test suggests that the Random Effects model is preferred over the Fixed Effects model, indicating the presence of individual-specific effects. The Sargan-Hansen tests for over identifying restrictions show insignificant p-values in the Differenced GMM and System GMM models, indicating that the instruments used in the models are valid. The AB AR (1) and AB AR (2) tests assess the presence of autocorrelation in the first and second-order differences, respectively. In the Differenced GMM and System GMM models, the p-values for these tests suggest that there is no autocorrelation present in the differenced errors.Also, the results of regression analysis using various models to examine the relationship between personal remittances and education, alongside control variables. Autocorrelation is detected in the differenced errors. Standard errors clustered at the country level (95% confidence interval) are shown in parentheses. The Sargan-Hansen test assesses instrument validity with a null hypothesis of over-identifying restrictions.

Model 2: Impact of Remittances on Health in BIMSTEC countries

In the previous section we discuss the impact of remittances on Education in BIMSTEC countries using GMM technique. And now, in this section we will study the impact of remittances on Health in BIMSTEC countries using the same technique. The graph in Figure 5 is a scatter plot showing the relationship between the independent variable, Rem, and the dependent variable, hel. In panel (a) the graph exhibits positive relationship between personal remittances and life expectancy at birth which is determinant of health and panel (b) explains the same relationship of Rem with hel for the seven BIMSTEC countries namely Bangladesh, Bhutan, Nepal, India, Sri Lanka, Myanmar, Thailand. It shows that at a single point in time and does not include any data points over time. Remittances (Rem) appear to have a positive correlation with Health (Hel). This means that places with higher remittance values also have higher health values. Skewness measures the asymmetry of the distribution, where positive values suggest a right-skewed distribution and negative values indicate a left-skewed distribution. Kurtosis quantifies the degree of peakedness or flatness of the distribution compared to a normal distribution. The probability values correspond to the significance level associated with the Jarque-Bera test for normality, with values less than 0.05 suggesting a departure from normality. The Jarque-Bera statistic, displayed in parentheses, provides a measure of the departure from normality, with higher values indicating greater deviation. In addition, table 10 shows that all variables are moderately correlated with the life expectancy at birth (hel) and except expenditure on health (exp) and clean water (wat) all other variables are negatively correlated with life expectancy at birth (hel).

Table 7 Estimation Results Pooled Ols, Random and Fixed effect

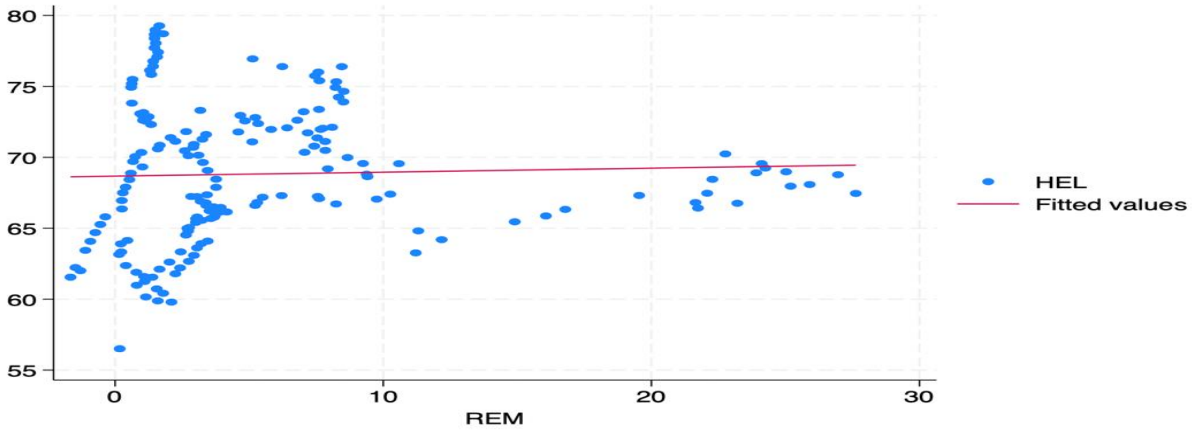
Variables	Pooled OLS		Random Effect		Fixed Effects	
	(1)	(2)	(1)	(2)	(1)	(2)
Dependent Variable: School enrolment, secondary (% gross) (Edu)						
Rem	1.437*** (0.001)	0.641 (0.228)	1.437*** (0.000)	0.640 (0.222)	0.383 (0.722)	1.068 (0.347)
Gcf	0.143 (0.33)	-0.617*** (0.002)	0.143 (0.33)	-0.617 (0.001)	0.332 (0.306)	0.144 (0.693)
Str	2.610** (0.020)	6.680*** (0.001)	2.610** (0.017)	6.680*** (0.000)	0.000*** (0.004)	0.000*** (0.000)
Gexp	0.245 (0.606)	-0.014 (0.983)	0.245 (0.604)	-0.014 (0.983)	0.602 (0.239)	0.570 (0.298)
Pci	0.011*** (0.000)	-	0.011*** (0.000)	-	0.007*** (0.000)	-
P_Edu	-	3.257*** (0.000)	-	3.257*** (0.000)	-	2.168*** (0.001)
Intercept	28.553*** (0.005)	-24.384 (0.202)	28.553*** (0.003)	-24.384 (0.196)	23.292 (0.081)	-38.343 (0.123)
No. of Observation	57	57	57	57	57	57
No. of Countries	7	7	7	7	7	7
R – squared	0.774	0.585	0.946	0.743	0.534	0.464
Hausman test	11.48 (0.022) (1) 4.47 (0.346) (2)					

*(i)***, ** and * denotes significance at 1%, 5% and 10% level of significance, respectively. (ii) p-values are in parentheses.*

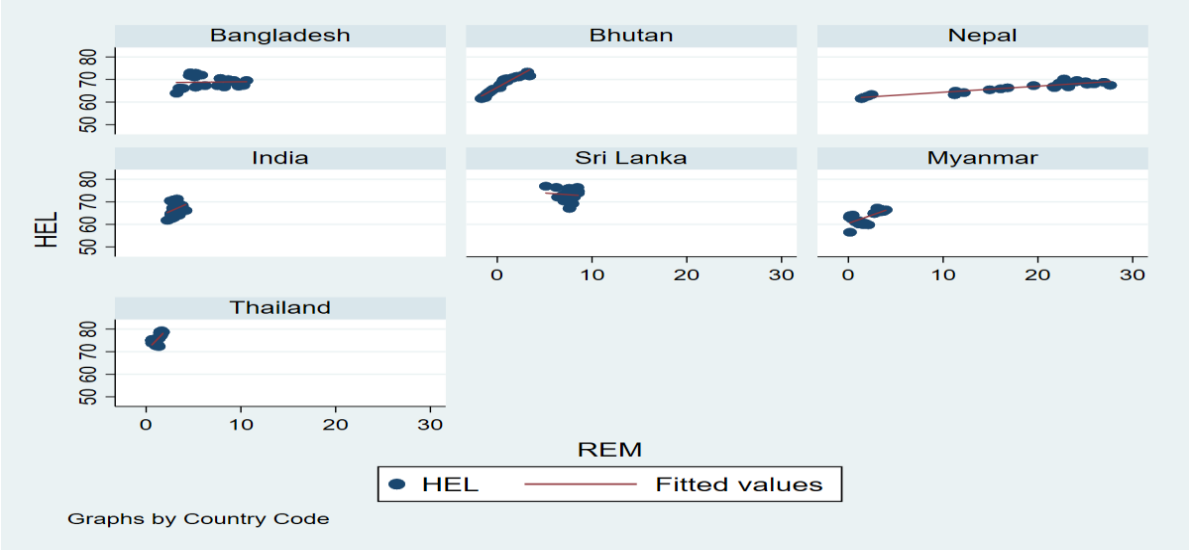
Table 8 Estimation Results Difference and System GMM

Variables	Difference GMM		System GMM	
	(1)	(2)	(1)	(2)
Dependent Variable: School enrolment, secondary (% gross) (Edu)				
Rem	0.404 (0.683)	-0.383 (0.496)	0.119 (0.689)	0.213 (0.492)
Gcf	0.451*** (0.009)	0.568 (0.000)	-0.061 (0.484)	-0.280*** (0.003)
Str	5.730 (0.470)	8.540 (0.266)	1.390 (0.896)	3.940*** (0.003)
Gexp	0.030 (0.935)	0.165 (0.646)	0.463 (0.118)	0.827*** (0.010)
Pci	0.002 (0.273)	-	0.004*** (0.000)	-
P_Edu	-	1.170** (0.019)	-	1.566*** (0.000)
Intercept	51.540*** (0.000)	13.107 (0.569)	15.855*** (0.036)	-30.960*** (0.007)
Edu_{t-1}	-0.047 (0.557)	-0.051 (0.496)	0.591*** (0.000)	0.619*** (0.000)
Time Period	1989-2002	1989-2002	1989-2002	1989-2002
Year Dummies	Yes	Yes	Yes	Yes
No. of Observation	32	32	52	52
No. of Countries	7	7	7	7
No. of Instruments	33	33	53	53
Sargan-Hansen Test				
AB AR(1) test p-value				

(i)***, ** and * denotes significance at 1%, 5% and 10% level of significance, respectively. (ii) p-values are in parentheses.



Panel (a)



Panel (b)

Figure 5 Best fitted line of Impact of remittances on Health (a) Overall (b) Country-specific

Table 9 Descriptive Statistics

Variables	Hel	Rem	Con	Gdp	Exp	Wat
Mean	70.559	7.853	63.222	3.887	6.648	63.530
Std. Dev.	3.802	8.383	13.266	3.791	3.676	20.890
Maximum	79.274	27.626	88.431	16.910	15.063	92.090
Minimum	65.457	0.000	35.783	-10.805	3.079	19.961
Skewness	0.917	1.157	0.116	-1.037	1.191	-0.519
Kurtosis	2.692	2.930	1.919	7.660	3.153	2.255
Jarque-Bera	10.680	16.522	3.773	80.189	17.567	5.033
Probability	(0.004)	(0.000)	(0.142)	(0.000)	(0.000)	(0.081)

(i)See Table 3 for details and definitions of variables. (ii) Values in (#) are p values.

Table 10 Correlation Matrix

	Hel	Rem	Con	Gdp	Exp	Wat
Hel	1.000					
Rem	-0.406	1.000				
Con	-0.440	0.874	1.000			
Gdp	-0.322	-0.066	-0.053	1.000		
Exp	0.770	-0.361	-0.490	-0.255	1.000	
Wat	0.590	-0.477	-0.741	-0.220	0.650	1.000

In order to examine the effect of migrant's remittances on health we first investigate the stationarity of variables included in the study. Table 11 presents the results of stationarity which suggest that all the variables are stationary either at the level or at the first difference. For all variables, the Levin-Lin-Chu (LLC) test at the level and at the first difference yields p-values of 0.05, indicating the rejection of the null hypothesis of a unit root, indicating that the variables are stationary. We have also calculated the results at both intercept (C) and intercept with trends(C&T) for in-depth analysis. The variable Gdp and Con are significant at both levels and the first difference but hel, rem and exp is only significant either at level or at the first difference. The critical values at 1%, 5%, and 10% significance levels further support these findings. Consequently, we have also shown the results of Im-Pesaran-Shin (IPS) test indicate that all variables exhibit stationarity either at levels or at first difference which will be subsequently used for further analysis.

Table 11 Results of stationarity tests

Variable	LLC				IPS			
	Level		First Difference		Level		First Difference	
	C	C&T	C	C&T	C	C&T	C	C&T
Hel	-3.370***	5.013	1.886	-7.655***	0.052	2.016	-3.208***	-7.037***
	(0.000)	(1.000)	(0.970)	(0.000)	(0.521)	(0.978)	(0.000)	(0.000)
Rem	0.189	1.127	-3.263***	-2.935***	1.189	2.424	-3.691***	-3.658***
	(0.575)	(0.870)	(0.000)	(0.001)	(0.883)	(0.992)	(0.000)	(0.000)
Con	-1.635*	-0.660	-3.626***	-2.796**	-1.941**	-1.162	-4.699***	-3.229***
	(0.051)	(0.255)	(0.000)	(0.002)	(0.026)	(0.122)	(0.000)	(0.000)
Gdp	-3.719***	-3.719***	-4.450***	-7.693***	-6.372***	-3.511***	-3.381***	-10.264***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exp	-0.319	-1.531*	-5.518***	-6.323	-0.212	-1.500*	-6.287***	-5.428***
	(0.375)	(0.063)	(0.000)	(0.000)	(0.416)	(0.066)	(0.000)	(0.000)
Wat	-3.124***	0.781	3.374	5.993	2.017	1.945	1.541	1.617)
	(0.001)	(0.783)	(1.000)	(1.000)	(0.978)	(0.974)	(0.938)	(0.947)

(i)LLC stands for Levin-Lin-Chu test and IPS stands for Im-Pesaran-Shin test (ii)C denotes constant and C&T denotes constant with trends
*(iii) ***,**, and * denotes significance at 1%, 5%, and 10%, respectively*

Table 12 presents the regression results analyzing the impact of various factors on life expectancy at birth across different estimation techniques, including Pooled OLS, Random Effects, Fixed Effects, Difference GMM, and System GMM and shows the results of the impact of personal remittances on health and other control variables. The dependent variable is health, and the parentheses contain standard errors clustered at the country level at a 95% confidence interval. The coefficient estimates for personal remittances are

statistically insignificant across all estimation methods, indicating that there is no significant association between remittances and life expectancy at birth similarly, the consumption expenditure is consistently positive and statistically significant at the 5% level across all estimation methods. This suggests that higher levels of consumption expenditure as a percentage of GDP are associated with higher life expectancy at birth. The estimates for GDP per capita growth are statistically significant in the Pooled OLS, Random Effects, and Fixed Effects models, but become insignificant in the Difference GMM and System GMM estimations. This implies that while GDP per capita growth may have a positive effect on life expectancy in some specifications, this relationship is not robust to all model specifications. The values of health expenditure are also statistically significant across all estimation methods except the System GMM. This suggests that higher government spending on health, as a percentage of general government expenditure, is associated with higher life expectancy at birth. And the estimates for access to basic handwashing facilities are consistently positive and statistically significant across all estimation methods. This indicates that higher access to basic hygiene facilities is associated with higher life expectancy at birth. In addition, Table 15 also shows that the intercept term is statistically significant in all models, indicating that there are other factors not included in the model that also influence life expectancy at birth. And the R-squared values vary across estimation methods, indicating the proportion of variance in life expectancy explained by the independent variables. The highest R-squared is observed in the Fixed Effects model, suggesting that this model explains a greater proportion of the variance in life expectancy compared to another model. Similarly, the Hausman test indicates whether the random effects assumption is valid. A significant p-value (below the conventional threshold of 0.05) suggests that the random effects model is inappropriate, and the fixed effects model should be preferred. In this case, the Hausman test suggests that the fixed effects model is preferable. The results from Sargan-Hansen test assesses that the validity of the over-identifying restrictions in the GMM estimation. A non-significant p-value indicates that the instruments used in the GMM estimation are valid. In this case, the Sargan-Hansen test results are non-significant for the Difference GMM and System GMM models, suggesting that the instruments used are valid. And the AB AR (1) and AR (2) test shows that the presence of autocorrelation in the first and second-order residuals. A non-significant p-value indicates no autocorrelation. In this case, the AR(2) test results are significant for the System GMM model, suggesting the presence of autocorrelation in the second-order residuals. Overall, the regression results suggest that factors such as consumption expenditure, government health expenditure, and access to basic hygiene facilities play significant roles in determining life expectancy at birth, while the impact of personal remittances and GDP per capita growth appears to be less consistent across different model specifications.

Table 12 Estimation Results

Variables	(1) Pooled OLS	(2) Random Effect	(3) Fixed Effects	(4) Differenced GMM	(5) System GMM
Dependent Variable: Life expectancy at birth, total (years)					
Rem	-0.231***	-0.231***	0.111**	-0.003	-0.004
	(0.005)	(0.003)	(0.015)	(0.878)	(0.757)
Con	0.156**	0.156**	-0.001	0.002	0.003
	(0.024)	(0.021)	(0.959)	(0.891)	(0.740)
Gdp	-0.098	-0.098	-0.023	0.012	0.022**
	(0.220)	(0.216)	(0.387)	(0.314)	(0.030)
Exp	0.635***	0.635***	0.157	0.009	0.000
	(0.000)	(0.000)	(0.172)	(0.866)	(0.991)
Wat	0.060**	0.060**	0.180***	0.014	0.001
	(0.030)	(0.027)	(0.000)	(0.246)	(0.754)
Intercept	54.850***	54.850***	57.382***	6.930**	3.046*
	(0.000)	(0.000)	(0.000)	(0.040)	(0.054)
Hel_{t-1}	-	-	-	0.891***	0.955***
				(0.000)	(0.000)
Time Period	1998-2023	1998-2023	1998-2023	1998-2023	1998-2023
Year Dummies	Yes	Yes	Yes	Yes	Yes
No. of Observation	74		74	68	74
No. of Countries	7	7	7	7	7
No. of Instruments	-	-	-	69	85
R – squared	0.665	0.831	0.804	-	-
Hausman Test	-129.89				
	(0.060)				
Sargan - Hansen Test	-	-	-	40.29	41.60
				(0.52)	(0.27)
AB AR(1) test p-value	-	-	-	0.571	0.463

*(i)***, ** and * denotes significance at 1%, 5% and 10% level of significance, respectively. (ii) p-values are in parentheses.*

Conclusion

The main aim of this chapter is to examine the impact of remittances on education and health in BIMSTEC countries using the GMM technique and to investigate the relationship between remittances, health, and education using a comprehensive dataset spanning from 1998 to 2022. The study also includes Pooled OLS, Fixed Effect and Random Effect. The results provide valuable insights into the dynamics between remittances and key socio-economic indicators, shedding light on their implications for education and health outcomes in BIMSTEC Countries. Futhermore, the major findings of the study can be summarized in the following points. First, the GMM estimation revealed significant relationships between remittances and education, the coefficients obtained from the difference and system GMM model indicates that the magnitude and direction of the relationships between variables changes over time. Second, a positive coefficient for remittances in the system GMM model suggests that an increase in remittances is associated with improvements in education and health outcomes in India and the health outcomes appears less pronounced, exhibiting mixed effects across different health

indicators. Similarly, the coefficients for other variables such as household consumption, GDP and domestic government health expenditure provide insights into their respective impacts on education and health. Third, this study suggested that remittances play a crucial role in shaping education and health outcomes in the long run, potentially contributing to socio-economic development and improved well-being. And confirmed that there exists a significant relationship among the remittances and other control variables.

Our findings reveals a significant relationships between remittances and key socio-economic indicators, suggesting that remittance inflows contribute to improvements in education and health. It is also important to acknowledge its limitations and suggest avenues for further research. One significant limitation is the lack of differentiation between rural and urban education and health outcomes in the analysis. By disaggregating the data and examining rural and urban contexts separately, future research can provide a more indepth understanding of how remittances impact education and health in different settings. One area for further research is to explore the dynamics of remittances, health, and education at the rural and urban levels separately. Rural and urban areas often have distinct socio-economic characteristics and face different challenges in terms of access to education and healthcare. Therefore, analyzing remittance effects separately for rural and urban areas can reveal variations in the impact of remittances on education and health outcomes. Furthermore, future research could explore the mechanisms through which remittances influence education and health outcomes. For example, qualitative studies could investigate how remittance inflows are allocated within households and communities and the extent to which they are invested in education and healthcare. Understanding these mechanisms can inform policy interventions aimed at maximizing the positive impact of remittances on human capital development. It is also important for future research to address potential endogeneity issues and control for other confounding factors that may influence the relationship between remittances, health, and education. Employing advanced econometric techniques, such as instrumental variable approaches or propensity score matching, can help mitigate bias and improve the robustness of the findings.

In conclusion, the inflow of workers' remittances exerts a significant and positive influence on education and health expenditure. This suggests that migrant households allocate a proportion of remittance inflows towards investments in education, underscoring the pivotal role of remittances in fostering human capital formation.

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