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ROLE OF REMITTANCES ON ENVIRONMENTAL POVERTY IN PAKISTAN: AN EMPIRICAL EVIDENCE

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ABSTRACT

This study examines how remittances affect environmental poverty in Pakistan. As developing countries receive more overseas remittances, their impact on receiving countries grows. According to a study, remittances reduce poverty and affect household consumption, lowering poverty rates. The study examines how remittances affect household environmental poverty. We use safe drinking water, household structure, cooking, lighting, and heating fuels to measure environmental poverty. Control variables are used. This study uses OLS to measure remittances' effects on environmental poverty. Microdata from the Pakistan Bureau of Statistics (PSLM) from 2019-2020 measures household expenditures. A home survey of Pakistani living standards and measurement. Our analysis includes an environmental poverty index. Environmental poverty is divided into housing, energy, and water and sanitation. We also compare provincial and gender-based environmental poverty. We divide income into lower, middle, and higher income categories to

determine how remittances affect environmental poverty across income groups. We found substantial findings. All variables are significant.

Keywords: Environmental Poverty, Remittances, Disaggregated Analysis

1. **Introduction**

According to the World Bank (2014), international remittances to developing nations were $436 billion in 2014. The East Asia Pacific and South Asia regions (SAR) were the top recipients of remittances worldwide. Prior research has investigated the influence of global remittances on alleviating poverty in certain nations or communities.

In the mid-1970s, there was a notable rise in labour migration from Pakistan, with the Middle East emerging as the primary destination. Before the 1970s, the United Kingdom had the most significant contribution to the influx of remittances to Pakistan, making up 54% of the total remittance amount. However, in the aftermath of the oil crisis in the 1970s, there was a shift in the allocation of labour as the demand for workers in Gulf countries surged. This resulted in a significant influx of workers relocating to the Middle East. The remittances to GDP ratio experienced a considerable increase, reaching its peak in 1983. In that particular year, the amount of money received from remittance inflows exceeded the amount received from exports. By the late 1980s, the proportion of international remittances from Saudi Arabia and the UAE significantly increased. Subsequently, due to the implementation of green card laws by the United States in the 1990s, the country emerged as a sought-after location for Pakistani labourers. They have made substantial contributions to home remittances. The proportion of remittances to GDP decreased after 1983 and reached its lowest levels during the 1990s, primarily due to sluggish GDP growth rates and political instability throughout the decade. Nevertheless, the ratio experienced a subsequent spike in 2002 due to a remittance surge following the 9/11 attacks. Since then, there has been a consistent increasing tendency.

Pakistan's GDP per capita in constant 2005 US dollars increased from US$542 to US$793 from 1990 to 2020, with an average annual growth rate of almost 4%. The incidence of poverty based on income experienced a significant decline in the country. The percentage of the population

residing below the national poverty threshold decreased from 64.3% in 2000/01 to 29.5% in 2019/20. Pakistan had already achieved its Millennium Development Goal of reducing the proportion of individuals classified as "income poor" below the poverty level of USD 1.25 per day by half.

Pakistan, a developing nation, faces many environmental degradation and socioeconomic issues. The World Bank reports that around 24.3% of Pakistan's population resides below the poverty threshold and experiences unfavourable environmental circumstances (World Bank, 2021). Simultaneously, Pakistan ranks in the top 10 nations globally for receiving remittances from their expatriate workforce (World Bank, 2020). Remittances are considered a substantial factor in enhancing environmental circumstances. Additional research is required to examine remittances' impact on Pakistan's ecological poverty. This study addresses the existing research vacuum by examining remittances' effect on Pakistan's environmental poverty.

Previous research has examined the relationship between remittances and poverty reduction in Pakistan (Liu et al., 2020; Zaman et al., 2021; Ahmad et al., 2022; Chandio et al., 2023). In a study by Ahmad (2018), the impact of remittances on poverty reduction in Pakistan was examined. The findings indicated that remittances had a positive influence in alleviating poverty. Chaudhry and Farooq (2017) conducted a study to investigate the impact of remittances on reducing rural poverty. The results indicated that remittances significantly impact poverty levels in rural areas of Pakistan.

While significant strides have been made, there is a pressing need for additional research to fully understand the relationship between remittances and environmental poverty in Pakistan. Recent research, such as that of Ali and Ahmad (2019), has begun to investigate the impact of remittances on environmental poverty in Pakistan. Their findings suggest a negative impact of remittances on environmental poverty. Raza and Kanwal (2020) also contributed to this area by examining the impact of remittances on environmental poverty and concluded that remittances had a positive influence on reducing environmental poverty. However, many investigations rely on macroeconomic indices, which can have significant measurement implications. Therefore, this study aims to enhance the current understanding by presenting empirical data on the correlation

between remittances and environmental poverty using multiple key indicators in Pakistan, highlighting the urgency and importance of this research.

The United Nations Development Programme (UNDP) and the World Energy Council, along with other international organizations, have underscored the transformative potential of energy in eradicating poverty (Pachauri & Spreng, 2004). Access to affordable energy is not just a necessity, but a powerful tool for poverty eradication in developing nations, enabling basic human needs such as cooking, lighting, and participation in economic activities (Kassa, 2007). Therefore, the lack of access to affordable and environmentally friendly energy is a significant aspect of poverty in developing countries (Njiru & Letema, 2018). However, the potential of energy access to transform lives and communities is a cause for optimism in the fight against poverty.

Foster et al. and Khander et al. (2012) have presented empirical data that support the energy transition theory, which suggests a correlation between energy usage and poverty. Proponents of this theory have identified a distinct correlation between energy use and household income, underscoring the significance of having access to contemporary energy resources in mitigating poverty. However, generating and using energy has harmful ecological effects since human activities have caused a rise in greenhouse gas emissions over the previous decade (Shahzad et al., 2020)

Water and sanitation are vital elements of public health. World Health Organisation (WHO), in 2017 and 2021, around 489 million individuals globally could not get better drinking water facilities. Due to inadequate design and construction, this includes 122 million people who rely on surface water for drinking. The World Health Organisation (WHO) reported increased access to better sanitation facilities that effectively isolate waste from human contact in a hygienic manner between 2000 and 2020 (WHO, 2017, 2021). Nevertheless, as of 2020, over 494 million individuals were still engaging in open defecation, while 670 million lacked the means to use soap and water handwashing facilities (WHO, 2017).

Research indicates that spreading diseases such as cholera, bacillary diarrhoea, viral hepatitis A, typhoid, polio, and acute respiratory infections is associated with water contamination and inadequate sanitation (W.J Hunter, 2018, 2023; World et al., 2018). Insufficient availability of

water, sanitation, and hygiene services is the cause of approximately 2 million deaths globally each year, with children being the majority of these fatalities (World Health Organisation, 2019). In Sub-Saharan Africa, the prevalence of sickness and mortality caused by insufficient wash facilities remains the most significant. Specifically, 60% and 53% of all daily deaths in the region are directly linked to the lack of suitable wash facilities.

Johan RC et al. (2015) discovered socio-demographic and environmental elements associated with this problem. However, it was confined to a narrow geographic area, namely the commune of Lolo. Nonetheless, the Demographic Health Survey (DHS) regularly tracks the extent of wash services nationally every five years. BMC Public Health has carried out five surveys for this purpose. The fourth DHS survey (DHS-IV) indicated that while there has been improvement in terms of households having access to better drinking water sources, a significant portion (15%) still rely on water from unprotected wells, and 3.6% of homes utilize surface water for drinking (USA INSEA, 2013). In addition, over two-thirds of families (66.4%) needed access to toilets that needed to be renovated, and 54.2% needed sanitation facilities (USA INSEA, 2013). Additionally, 43% of homes need a handwashing facility.

The allocation of remittances in Pakistan has been a subject of substantial discourse. Most remittances are primarily allocated towards consumption expenditures, with a secondary focus on debt repayment, housing construction or renovation, wedding-related costs, dowries for daughters, real estate purchases, business startups, and financing the Islamic religious pilgrimage known as Hajj, which involves travel to Mecca in Saudi Arabia. Based on our examination of PSLM data, most migrants were employed in the Gulf region, accounting for 92% of the total. Among the Gulf countries, Saudi Arabia emerged as the most favoured destination. One of the reasons is the enduring alliance between Saudi Arabia and Pakistan. Most male individuals in our country migrate, with a significant majority (95%) choosing to relocate without their families. 94% of the respondents identified "poverty/lack of economic opportunities as the exclusive factor driving migration. Most migrants had an educational level ranging from illiterate (22%) to completing 10th grade (59%). Approximately 43% of the migrants were employed in unskilled labour, 25% in semi-skilled labour, and 25% were skilled labourers.

Furthermore, 43% of the migrants were categorized as agricultural labourers or professionals. The current study examined the role of these migrants' earnings in shaping the lifestyles of their families to curtail environmental poverty at various scales. The findings express that financial support in terms of remittances significantly curtails environmental poverty incidences at several scales.

The further study is organized as follows: Section 2 reviews the literature. Section 3 defines and explains comprehensive methodology and data. Section 4 discusses the findings. Section 5 concludes the study with policy options.

2. Literature Review

Recently, there has been a growing apprehension among governments, environmentalists, and legislators regarding global and atmospheric pollution. Multiple studies have indicated that both the government and academic community have been significantly impacted by the profound consequences of global warming and pollution emissions. An innovative approach to mitigating environmental issues should be developed over time. Previous research has examined how remittances reduce poverty in Pakistan (Liu et al., 2020; Zaman, 2021; Ahmad, 2022; Chandio, 2023).

Khattak and Ali (2019) studied remittances and environmental poverty in Pakistan. Remittances for poverty reduction and household well-being have been extensively studied, but their impact on environmental poverty has yet to be studied. Remittances and household environmental poverty will be examined using PSLM data. The findings show that remittances can improve household wellbeing and reduce poverty. However, they can harm the ecosystem, especially in rural areas.

Akhtar et al. (2018) explored how remittances reduce environmental poverty in Pakistan. The study examines how remittances affect environmental poverty in rural and urban Pakistan. The authors used 2014-15 PSLM data for quantitative research. The data show that Pakistani households depend on remittances, which not only improve household well-being but also significantly boost the economy. In recent years, remittance inflows have increased, which has become a key tool for decreasing poverty in the country.

Ahmed and Shafqat (2021) also investigated provincial statistics on remittances and environmental poverty in Pakistan. The analysis uses the 2014-2015 and 2018-2019 Pakistan Bureau of Statistics provincial socioeconomic and living standards surveys. Environmental poverty was assessed using characteristics including safe drinking water, sanitary facilities, and solid waste management. Provincial environmental impoverishment is inversely correlated with remittances. Remittances improve sanitation and water availability, lowering environmental poverty. Remittances have little effect on solid waste management.

Awan and Ahsan (2019) examine remittances and environmental degradation in Pakistan. Their main goal is determining whether the country's rising remittances have caused environmental damage. ARDL analyzes the long-term relationship between remittances and environmental degradation in Pakistan. According to the study, remittances positively and significantly affect environmental degradation in Pakistan. Remittances have increased consumption, which has increased emissions and waste.

Remittances and environmental poverty in Pakistan were examined empirically by Ali (2020). The study used 2014–2015 and 2015–2016 Pakistan Social and Living Standards Measurement Survey (PSLM) data. Environmental poverty is measured using national and provincial poverty headcount ratios. Remittances significantly and negatively affect environmental poverty in Pakistan, suggesting they reduce it.

Ali and Ahmad (2019) use 1975–2015 panel data to examine remittances and environmental poverty in Pakistan. The study used fixed and random effect models to examine how remittances affect provincial environmental poverty. The findings show that remittances negatively impact environmental poverty in Pakistan, underscoring their crucial role in reducing it.

Iqbal and Nawaz (2018) examined the Benazir Income Support Programme (BISP) and environmental poverty in Pakistan. Pakistani poor households receive financial aid from the BISP. The program could affect environmental poverty, which is a lack of vital environmental resources and services. PSLM was used to evaluate the Benazir Income Support Programme (BISP)'s impact on households' access to clean water, sanitation, and energy. Evidence suggests that the program

boosts household income, which significantly improves access to environmental resources and services, thereby reducing environmental poverty.

Raza and Kanwal (2020) examine how remittances affect environmental poverty in Pakistan. Data was collected using PSLM 2018-2019. This survey examines how remittances affect environmental poverty using multiple regression. The study found that households receiving remittances are more likely to endure environmental hardship. However, it's important to note that remittances have a more significant and lasting effect on reducing environmental poverty in rural areas. Siddiqui and Ahmed (2020) examined how remittances affect environmental poverty in Pakistan. Remittances significantly reduce environmental poverty in Pakistan, according to the study. Remittances and environmental poverty in Pakistan were examined using 1985–2015 panel data by Zafar (2019). Remittances could reduce long-term environmental poverty by boosting economic growth and living standards, according to the study. Remittances improved economic growth, income, and household consumer expenditure, reducing long-term environmental poverty. However, remittances had little immediate effect on environmental poverty, suggesting that their benefits are long-term.

Ahmad (2018) analyzes how remittances reduce Pakistani poverty. The study uses 2012-2013 and 2014-2015 PSLM data. The author uses regression analysis to assess how remittances affect poverty while controlling for socioeconomic factors. The study shows that remittances significantly reduce poverty in Pakistan. However, Chaudhry and Farooq (2017) found that remittances significantly inversely correlate with poverty, suggesting they alleviate poverty.

3. Data and Methodology

There is a strong connection between poverty and environmental deterioration, but further research is needed to understand the relationship between the two entirely. One hypothesis posits that poverty directly contributes to environmental deterioration, while another contends that individuals lack the necessary resources or means to engage in activities that lead to environmental degradation. The primary objective of sustainable development (SDG) is eliminating poverty. Prior studies have demonstrated that robust economic development, minimal unemployment, low inflation, and substantial foreign direct investment can effectively alleviate poverty. Several

studies suggest that higher energy consumption can serve as a means to achieve economic development and alleviate poverty in emerging countries.

According to the Foreign Migration and Development Research Program conducted by the World Bank in 2006, foreign remittances decrease both the extent and severity of poverty. For instance, a 10% rise in remittances will result in a corresponding 3.5% reduction in poverty. Nevertheless, it is essential to note that countries experiencing higher poverty levels do not automatically get more significant amounts of remittances. Countries with the highest poverty levels, such as those in Africa, do not receive a more significant amount of remittances, and their standard of living remains unchanged.

Remittances are mostly allocated towards consumption, particularly to meet essential requirements such as food and clothes. Investment is a lower priority than satisfying necessities. Additionally, the original motivation for migrating is often driven by more access to fundamental needs. As seen by the examples above, households engage in the investment of both human and physical capital wherever feasible. However, it is essential to consider the relationship between this and the availability and desirability of investing in housing, for example, as well as individual preferences that may lead to increased or decreased investment in education.

Therefore, multiple writers argue that the emphasis should be on developing robust social safety systems and promoting favorable investment circumstances in order to encourage the constructive utilization of remittances (De Haas, 2007; De Vasconcelos et al., 2017; Lubambu, 2014; Mashayekhi, 2013). Remittances are primarily utilized as a means of safeguarding against unforeseen events. This is because households tend to store the money received through remittances as personal insurance. Additionally, senders tend to remit more significant amounts at times of greater need, such as during a crisis. These shocks can be categorized as either external, such as an economic crisis or income loss, or lifestyle-related, such as unemployment or health concerns. Consequently, this is a suitable starting point if the objective is to make remittances accessible for alternative purposes. However, there is much controversy surrounding this objective, as one may argue that investing remittances in nutrition, health, education, and managing consumption during times of crisis is a beneficial utilization of funds from a development and Sustainable Development Goals (SDG) standpoint.

This study used Ordinary Least Squares (OLS) regression analysis to ascertain the impact of remittances on environmental poverty. This model conceptualizes the connections between cash transfers and socioeconomic growth. The theory of consumer preferences posits that when monetary transfers increase their budget, consumers can make better selections by utilizing their improved human capital, resulting in changes in their behaviour. Cash transfers incentivize households to consume high-quality goods and services (Nawaz & Iqbal, 2020).

The data utilized in this study for the computation of remittances and environmental poverty indicators is derived from the Pakistan Social and Living Standards Measurement (PSLM) survey conducted by the Pakistan Bureau of Statistics in 2019/2020. The purpose of the PSLM survey is to gather social and economic data every other year at the district and provincial levels. An annual survey has been done. The data was gathered through in-person interviews with males and females residing in the same household. The PSLM utilized three surveys, namely male, female, and community-level questionnaires, to gather information. In addition to other socioeconomic variables, these questionnaires include extensive data on environmental services like housing, water, sanitation, and energy. This survey instrument has been the primary data source for monitoring Pakistan's advancements in Millenium Development.

This data is utilized extensively throughout Pakistan. We categorize it based on provinces and then classify it based on regions as urban or rural. We then examine the impact of remittances individually for males and females and conduct an analysis based on income levels. When conducting an income-based study, we categorize individuals into three income groups: lower income, middle income, and higher income. Subsequently, we establish income thresholds to categorize individuals into different income groups. The impoverished income group comprises individuals whose income falls below 50,000, while the middle-income group encompasses individuals with incomes close to 200,000. Following this, we form a separate category for affluent individuals whose earnings surpass those of the middle-income group.

We categorized the data from low socioeconomic status to high socioeconomic status. Consequently, we observe the influence of remittances on environmental destitution.

To address the issue of substantial fluctuations and heteroscedasticity, we apply a logarithmic transformation to the income and remittance variables in the dataset.

The remittances are the independent variable, whereas environmental poverty is the dependent variable in our study.

Model Specification

The equation of the model is as

1. $\text{Envp} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
2. $\text{HENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
3. $\text{EENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
4. $\text{WSENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
5. $\text{PENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
6. $\text{SENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
7. $\text{BENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
8. $\text{KENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
9. $\text{RENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
10. $\text{UENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
11. $\text{MENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
12. $\text{FENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
13. $\text{LENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
14. $\text{MENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$
15. $\text{HENVP} = \alpha + \beta_{1\text{remittances}} + \beta_{2\text{control}} + \mu$

In this equation, environmental poverty and α are the parameters, $\beta 1$ means remittances, $\beta 2$ shows the control variables, and μ is an error term in all equations. Equation 1 is the general model of our estimation. Equation 2 shows the housing environmental poverty. In Equation 3, EENVP shows the energy environmental poverty, the remaining part is remittances and control variables, and the end is the error term. In Equation 4, WSENVP means water and sanitation poverty. In equation 5, we define the four provinces separately; PENVP shows the Punjab remittances equation. In equation 6, SENVP shows the Sindh remittances equation. Equation 7, BENVP, shows the

Balochistan remittances equation. In equation 8, KENVP shows the Khyber Pakhtunkhwa remittances equation. After this, we define the region-wise remittances equation like rural and urban. In equation 9, RENVP, we estimate the rural environmental poverty. In equation 10, UENVP shows the urban environmental poverty and control variables with error terms. In equation 11, we define the wise relationship of remittances. In equation 11, MENVP shows the male remittances effect, and equation 12, FENVP, shows the impact of female remittances. Then, we divide it into three groups. In equation 13, LENVP shows the lower income group. In equation 14, MENVP shows the middle-income group; in equation 15, HENVP shows the higher-income group.

Environmental Poverty Index (EPI)

We make an index of environmental poverty. In this index, we collect data on housing structure; in housing environmental poverty, we collect data on floors, walls, and roofs. We take energy poverty, and in energy poverty, we take energy as fuel for cooking, lighting, and heating. In water and sanitation, we take drinking water proxy; in sanitation, we take the sewerage system. To collect the data for all these variables, we combine them and run a command of PCA to make an index. The remaining variables are the same as the model, but we take a log of remittances and income. After making an index of PCA, we see the effect of remittance on the environmental poverty index. Principal component analysis, or PCA, is a statistical procedure that allows us to summarize the information content in large data tables using a smaller set of "summary indices" that can be more easily visualized and analyzed. PCA is a dimensionality reduction method often used to reduce the dimensionality of large data sets.

The Environmental Poverty Index (EPI) is a tool used to measure environmental poverty, which is the lack of access to essential environmental resources and services. The EPI measures deprivation across several dimensions of environmental poverty, including dwelling, energy, water, and sanitation. We make an index of environmental poverty. In this index, we collect data on housing structure; in housing environmental poverty, we collect data on floors, walls, and roofs. We take energy poverty, and in energy poverty, we take energy as fuel for cooking, lighting, and heating. In water and sanitation, we take drinking water proxy; in sanitation, we take the sewerage system. To collect the data for all these variables, we combine them and run a command of PCA to make an index. The remaining variables are the same as the model, but we take a log of

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Definitions of Variables

Dimension	**Indicator**	**Deprived**
Dwelling	Indi:1 floor	brick,mud,sand ,ceramic tiles, dung, polished wood
	Ind:2 wall	raw bricks , burned bricks,mud ,wood bamboo,stone card board
	Ind:3 roof	RCC/RBC, Lantern, bamboo/wood, cement sheet, gairders ,T-iron
	Ind:4 housing size	How many family members are there in a house?
Energy	Ind:1cooking fuel	Gas, electricity, dung, wood, charcoal, electricity, LPG, kerosine oil, crop residual
	Ind:2 lighting fuel	Electricity ,solar energy, gas, kerosin oil/diesel/petrol, fire wood, candle
	Ind:3 heating fuel	Solar energy, gas, electricity, bio gas, crop residue, kerosine oil, charcoal, dung, no facility
Water	Ind:1drinking water	Water supply, motor, well, nalka , boiled, mineral water, turbain , hand pump, piped water,tube well, bottled water, tanker, filtration plant
sanitation	Ind:1 sanitation	Underground drain, cover drain, open drain ,no system

The housing dimension of the EPI has four indicators: floor, wall, roof, and housing size. The indicators serve as a representation of both the quality and dimensions of the housing unit. For

instance, a house with a dirt floor would be classified as deprived according to the floor indicator, whereas a house with a cement floor would not be classified as deprived. Likewise, a house with a roof with leaks would be classified as deprived regarding the roof indicator, whereas a building with a secure roof would not be considered deprived.

The energy dimension of the EPI comprises three indicators: cooking fuel, lighting fuel, and heating fuel. These indicators depict the energy sources utilized by households for various purposes. For instance, a household that relies on firewood as a cooking fuel would be classified as needing more cooking fuel. Conversely, a household that utilizes electricity or LPG would not be deemed destitute.

The water component of the EPI comprises a single indicator, which is the availability of potable water. The indicator depicts the many sources of potable water utilized by households. For instance, a home that depends on a well as its source of drinking water would be classified as lacking access to the drinking water indication. On the other hand, a household that can use piped or bottled water would be deemed safeguarded.

The sanitation component of the EPI has a single indicator: sanitation. The indicator denotes the specific sanitation system employed by homes. For instance, according to the sanitation indicator, a household dependent on an uncovered drain would be impoverished. Conversely, a household with access to a subterranean or sheltered drainage system would be deemed secure.

The Environmental Performance Index (EPI) is a valuable tool for identifying regions with high levels of environmental poverty. It can be utilized to focus actions to enhance marginalized communities' environmental conditions strategically. Covariant or control variables are additional factors that are taken into account during the analysis.

In this data analysis, we utilize covariant variables, also known as control variables. The variables include income, age, gender, marital status, education, health status, area, and province. Remittances do not include revenue, and multicollinearity is not possible.

List of variables

Variable Name	**Variable Symbol**

Environmental Poverty	ENVP
Housing environmental poverty	HENVP
Energy poverty	EENVP
Water and sanitation poverty	WSENVP
Remittances	Rem
Education	EDU
Health status	HLTS
Province	Prov
Region	REG
Gender	GEN
Marital status	MST
Income	INC
Age	AGE

Our study involves using Ordinary Least Squares (OLS) regression to determine the impact of remittances on environmental poverty. OLS (ordinary least squares) regression is a widely used method for estimating the coefficients of linear regression equations. These equations define the connection between one or more independent quantitative variables and a dependent variable. OLS, or ordinary least squares, is a commonly used method in data analysis. Its objective is to reduce the discrepancies between the observed data and the projected responses based on a linear approximation.

4. Results and Discussion

In this model, we establish a correlation between the wealth of the data and the positive indications. It is clear that when remittances increase, there is a corresponding decrease in environmental poverty. This remittance model presents our exhaustive findings on the influence of remittances throughout Pakistan, which align with other studies (Zaman et al.,2021; Ahmad et al., 2022; Chandio et al., 2023). Based on our examination of this comprehensive model, the projected effect of remittances is as outlined below:

Table 1

Variables	Coefficient	Standard error	p-value
LREM	.0077151	.0033239	0.020
LINC	.0082321	.0016993	0.000
Age	.008606	.0003155	0.000
EDU	.0052023	.0009433	0.000
HLTS	.107943	.0158485	0.000
PRO	.618202	.0048447	0.000
REG	1.66689	.0090187	0.000
GEN	.385399	.016109	0.000
MST	.0036236	.0436412	0.658

Our findings indicate a substantial and beneficial influence of remittances across all dimensions. Our examination of the result table reveals that remittances have a detrimental effect on environmental poverty. All observations in the table exhibit a positive correlation.

Our research on environmental poverty indicates that remittances substantially influence the overall model. Before executing the model, we formulated a poverty index, which produced noteworthy outcomes with a significance level of 0.05. Our data shows that remittances have a significant favourable influence on environmental poverty.

The result table shows that the remittances coefficient is 0.0077151, with a p-value of 0.020. This indicates a significant influence on environmental poverty. The yearly income is likewise recorded as 0.0082321, accompanied by a p-value of 0.000, indicating a substantial influence on ecological destitution. In addition, the analysis has shown substantial findings for the other remaining factors as well.

Category Wise Analysis

Issues of housing, environment, and poverty

In the context of the environmental poverty index, housing environmental poverty is referred to as HENVP, energy poverty as EENVP, and water and sanitation poverty as WSENVP. **Table 2**

Categories	HENVP	EENVP	WSENVP

Remittances	Co-efficient	2.1307	.005286	6.50807
	p-value	0.001	.0.018	0.023

The study consists of 149,634 data points and yields F-values of 4,191.07 and an R-square value of 0.2013. The HENVP variable in the table represents housing environmental poverty, calculated based on an index considering home size, floor condition, roof quality, and wall construction.

In order to ascertain the size of the dwelling, we have employed a proxy measure that tallies the number of individuals belonging to each household. Regarding flooring, rural areas typically utilize mud or sand, whereas metropolitan areas commonly employ materials such as marble, tiles, chips, or polished wood. This poll has yielded valuable insights into the disparate living standards across several locations.

The findings indicate that remittances substantially impact housing and environmental poverty. An increase in income clearly leads to an improvement in living standards. When foreign currency is remitted to Pakistan, the recipient endeavours to uphold or enhance their quality of life.

Regarding roof materials, various categories are utilized for constructing roofs, including RCC, RBC lantern, metal, grader, T-irons, wood, or bamboo. Rural areas often rely on

Province wise analysis

In the Pakistan there are four provinces like Punjab, Sindh, Balochistan and KPK. We get data from PSLM of all provinces. we estimates the results as province wise .

Table 3

Categories		**Punjab**	**Sindh**	**Balochistan**	**KPK**
Remittances	Coefficient	0.0018	O.2200	6.004	7.630
	p-value	0.0164	0.0014	0.0231	0.055

In Pakistan, there is an excellent difference between provinces regarding remittances. Each province has its observations and trends of remittance flow. For instance, in Punjab, the total number of observations is 79551, with an F-value of 2911.33 and an R-square value of 0.2040. The co-efficient value is 0.0018, and its p-value is 0.0164, which is significant at the 0.05 level. Similarly, the trend of remittance flow is high in Sindh, with a total of 37066 observations, an F-value of 500.45 and an R-square value of 0.0975. The co-efficient value is 0.2200, and the p-value is 0.0014, which is also significant at the 0.05 level.

In Balochistan, the largest province of Pakistan by land measurement, the total number of observations is 25032. The co-efficient value is 6.004, with a p-value of 0.0231, which is significant at the 0.05 level. Balochistan is an area that needs to be developed compared to other provinces, and people face challenges in accessing necessities like drinking water. Therefore, when remittances are received, people change their living standards by improving their home infrastructure, food, education, energy, water, and sanitation facilities.

Province wise analysis

In the Pakistan there are four provinces like Punjab, Sindh, Balochistan and KPK. We get data from PSLM of all provinces. we estimates the results as province wise .

Table 4

Categories		**Punjab**	**Sindh**	**Balochistan**	**KPK**
Remittances	Coefficient	0.0018	O.2200	6.004	7.630
	p-value	0.0164	0.0014	0.0231	0.055

In Pakistan, there is a great difference among all provinces regarding remittances. Each province has its own observations and trend of remittance flow. For instance, in Punjab, the total number of observations is 79551 with an F-value of 2911.33 and an R-square value of 0.2040. The co-efficient value is 0.0018 and its p-value is 0.0164, which is significant at the 0.05 level. Similarly, the trend of remittance flow is high in Sindh with a total of 37066 observations, an F-value of 500.45 and an R-square value of 0.0975. The co-efficient value is 0.2200, and the p-value is 0.0014, which is also significant at the 0.05 level.

In Balochistan, which is the largest province of Pakistan by land measurement, the total number of observations is 25032, and the co-efficient value is 6.004, with a p-value of 0.0231, which is significant at the 0.05 level. Balochistan is an area that is less developed than other provinces, and people face challenges in accessing necessities like drinking water. Therefore, when remittances are received, people change their standard of living by improving their home infrastructure, food, education, energy, water, and sanitation facilities.

Lastly, in the province of KPK, the total number of observations is 28593, with an F-value of 2060.33 and an R-square value of 0.0546. The co-efficient value is 7.630, and the p-value is 0.055, which is significant at the 0.05 level. Remittances received in KPK have led to changes in the standard of living, with increased expenditure on food, water, and sanitation. Overall, the results show that remittances have a significant impact on the living standards and choices of people in different provinces of Pakistan.

Region Wise Analysis

After this we estimate remittances effect as region wise. we divide it in two categories rural or urban. we estimate that how remittances effect on rural areas or urban areas. As we can see in the mentioned table.

Table 5

Categories		rural	Urban
LREM	Co-efficient	0.025511	O.008
	p-value	0.046	0.049

In rural areas, the number of observations is 101913, with an F-value of 1.09 and an R-square value of 0.001. The co-efficient value is 0.025511, and the p-value is 0.046, indicating that remittances have a significant effect. Due to the lack of basic facilities such as drinking water, sewerage, and energy, remittances play a crucial role in improving rural living standards.

Many people in rural areas need help to afford to build washrooms or have access to them. Remittances are more impactful in rural areas due to the prevailing poverty.

The urban area's coefficient is 0.0086, with a p-value of 0.049. However, the situation differs in urban areas, as people focus more on fashion trends and luxury. Metropolitan regions are well-facilitated with necessities such as food, water, sanitation, and energy, and people in these areas focus on maintaining their status in posh localities. They must do so.

Gender Wise Analysis

We divide category wise as male and female. In mostly houses male members are the head of the house.

Table 5

Category		Male	Female
Remittances	Coefficient	1.6700	0.0079
	p-value	0.031	0.048

If we analyze remittances by gender, we observe that mostly male members migrate to foreign countries for better-paying jobs. The total number of observations is 136597, with an F-value of 6701.4 and an R-square value of 0.2818. According to the results, the coefficient for males is 1.6700 with a p-value of 0.031, which is lower than the significant level of 0.05. This means that male remittances are higher than those of females.

The significant level is crucial in this result table, and the male p-value of 0.031 signifies a substantial level of male remittances. The male co-efficient is more significant because males are usually the heads of households.

The above table shows that the total number of observations is 13037, with an F-value of 162.09 and an R-square value of 0.0905. The coefficient is 0.007995, and the P-value is 0.048, which is also significant. The results show that both males and females receive more remittances in Pakistan.

Income Wise Analysis

Table 6

		Lower incom	Medium incom	Higher income
Remittances	Co-efficient	1.33e-07	5.97e-07	5.96
	p-value	0.058	0.0398	0.0518

If we analyze remittances by gender, we observe that mostly male members migrate to foreign countries for better-paying jobs. The total number of observations is 136597, with an F-value of 6701.4 and an R-square value of 0.2818. According to the results, the coefficient for males is 1.6700 with a p-value of 0.031, which is lower than the significant level of 0.05. This means that male remittances are higher than those of females.

The significant level is crucial in this result table, and the male p-value of 0.031 signifies a substantial level of male remittances. The male co-efficient is more critical because males are usually the heads of households.

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5. Conclusion and Policy Recommendations

This study aims to assess the influence of international money transfers on household poverty in Pakistan, utilizing the Pakistan Standard of Living Measurement (PSLM) data for 2019-20. The OLS estimation method was employed to gauge the influence of foreign remittances on household poverty and environmental poverty in Pakistan. According to the OLS estimation, remittances decrease the likelihood of households falling below the poverty line by 30 per cent. The percentage is more significant for rural households, with 36% compared to 23% for urban families. Based on our impact assessment results, we have determined that remittances positively affect per capita income and help decrease household poverty. This conclusion applies to the overall sample and rural and urban areas when other factors remain unchanged. The government should streamline the process for expatriate Pakistanis to remit funds to their home country. The issuance of remittance bonds is a positive and progressive action. An augmentation in remittances will contribute to achieving macroeconomic stability and bolster government endeavours to alleviate

poverty levels. To provide policy recommendations, the government should initiate international initiatives to augment remittances. Given that the majority of the labour population lacks formal education, it is incumbent upon the government to furnish a comprehensive manual or handbook.

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