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Evaluating the impact of remittances on child education and healthcare expenditures in Morocco: A matching method approach.

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Abstract

This paper uses an econometric model based on propensity score matching to analyze the impact of remittances from Moroccans residing abroad (MRA) on children's education and healthcare expenditures. The results indicate that households receiving these remittances have significantly higher rates of medical consultations and education than those that do not receive them. This trend is particularly pronounced in rural areas, where access to healthcare and education services may be more limited. Remittances thus emerge as a crucial lever for improving the living conditions of households, underscoring their vital role in the economic and social support of families, especially in regions with limited resources. These findings emphasize the importance of public policies that facilitate the transfer and effective use of remittances to maximize their benefits on household well-being.

Keywords: Remittances, Household, Healthcare, Children’s education, Moroccans residing abroad.

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Introduction

Remittances from migrants represent a significant financial flow for many developing economies, playing a crucial role in poverty reduction and improving household welfare. In Morocco, remittances from Moroccans residing abroad (MRA) are vital at both macroeconomic and microeconomic levels. At the macroeconomic level, they are a major source of foreign currency, contributing to the balance of payments and offsetting trade deficits. In 2023, remittances reached 115.2 billion MAD, a 4% increase from 2022, accounting for about 8.3% of GDP (Office de changes, 2023). These flows support the national currency, stabilize the economy, and enhance investor confidence, competing with other foreign currency sources like tourism, exports, and foreign direct investment. The positive impact of remittances on economic growth is increasingly evident, particularly as their proportion of GDP rises.

Ismaili Idrissi & Kawkaba (2023), highlight that remittances contribute to poverty reduction by boosting income levels, with their effect becoming more pronounced as the volume of remittances relative to GDP increases.

At the microeconomic level, remittances raise household disposable income, improving living standards by providing better access to essentials like food, housing, education, and healthcare. They also fuel entrepreneurial activities, promoting job creation and local economic growth while helping reduce poverty. A key benefit is the investment in children's education, allowing families to afford tuition, supplies, and access to better institutions. Additionally, health expenditures, often a significant burden for low-income families, are eased by remittances, enhancing healthcare access.

While the macroeconomic impact of remittances is well-researched, fewer studies focus on their specific effects on education and healthcare. This is especially true in Morocco, where the literature tends to highlight overall consumption and poverty reduction.

Adopting a positivist approach, this article seeks to fill this gap by analyzing the impact of remittances on children's education and healthcare expenditures among Moroccan households. Using a matching method to control for selection bias, the study rigorously estimates the effects of remittances on these two key dimensions of human capital education and health and sheds light on their role in Moroccan household socio-economic development.

However, due to lack of recent available data, the present research is based only on the data from the National Survey on Household Consumption and Expenditure (ENCDM) conducted by the High Commission for Planning (HCP) during 2013-2014 period.

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The remaining part of this research is structured as follows: Section 1 examines the dynamics of household expenditures on healthcare and children's education in Morocco. Section 2 analyzes the evolution of remittances over time. Section 3 reviews the relevant literature and formulates the study's hypotheses. Section 4 presents the research methodology, including data, descriptive analysis and correlation of variables. Finally, Section 5 presents the econometric model and reports the empirical results, which are discussed in detail.

1. Dynamics of household expenditures on healthcare and children's education in Morocco

The analysis of household expenditures on healthcare and children's education is key to understand the priorities and challenges faced by Moroccan families. With limited financial resources, households must balance immediate needs with long-term goals for their children's well-being and development.

The first subsection examines healthcare expenditures, focusing on regional differences, income levels, and the types of healthcare services accessed. This is crucial for understanding disparities in healthcare access, particularly between urban and rural areas.

The second subsection addresses education expenditures, exploring to what extent households spend on schooling at various educational levels. It highlights challenges in providing quality education and examines disparities across different stages, from preschool to higher education. Factors like income, geographic location, and the availability of public versus private schools are key in shaping these expenditures.

1.1. Dynamics and trends of household health expenditures in Morocco

Household health expenditures play a crucial role in determining access to healthcare and the quality of life for households. In Morocco, these expenditures reflect not only the economic priorities of families but also the structural challenges within the national health system.

Table 1: Evolution between 2001 and 2014 of budget shares (in %) for health expenditures by place of residence

Area	**Urban**			**Rural**			**Overall**		
Years	**2001**	**2007**	**2014**	**2001**	**2007**	**2014**	**2001**	**2007**	**2014**
Hygiene and medical care	8,3	7,6	**9,2**	5,6	6,3	**7,5**	7,6	7,2	**8,7**

Source: Authors' calculations based on data from ENCDM 2000-2001, 2013-14, HCP

The table 1 illustrates the evolution of budget coefficients dedicated to health expenditures, particularly for hygiene and medical care, over the period from 2001 to 2014. These data, derived from the National Survey on Household Consumption and Expenditures (ENCDM),

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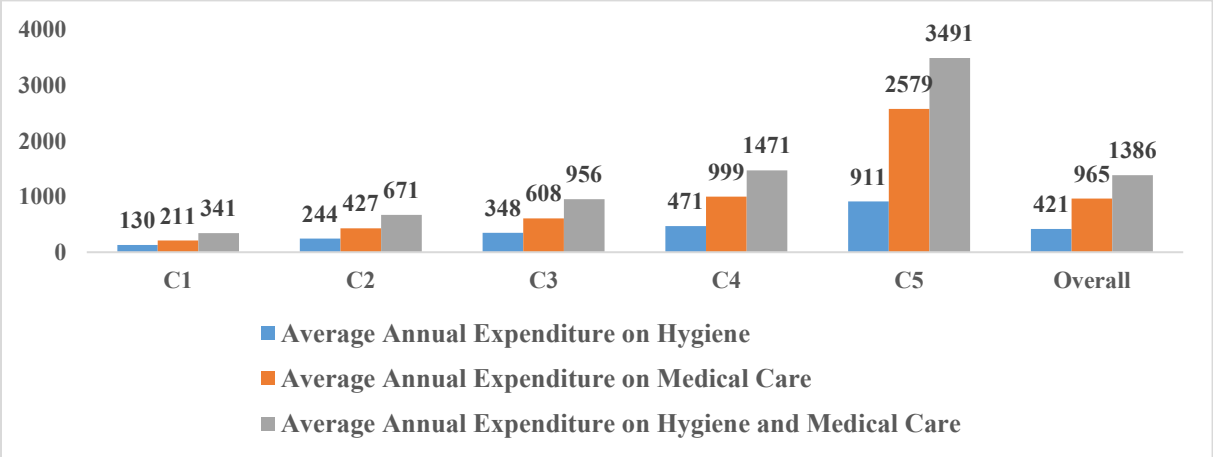
provide a detailed analysis of the financial behaviors of Moroccan households, both at the national level and according to their place of residence, whether urban or rural.

At the national level, household budget coefficients have shown a moderate increase, rising from 7.6% in 2001 to 8.7% in 2014. This general trend indicates a growing effort by Moroccan households to allocate a larger portion of their budget to healthcare, reflecting a gradual awareness of the importance of health-related investments for family well-being.

In urban areas, the budget coefficients allocated to hygiene and medical care experienced a slight decline between 2001 and 2007, decreasing from 8.3% to 7.6%. However, a significant rebound occurred in 2014, with these coefficients reaching 9.2%. This shift suggests increased awareness among urban households of the importance of health expenditures, potentially due to improved access to medical care and hygiene awareness initiatives. Additionally, the growing urbanization and lifestyle changes seem to encourage these households to prioritize health spending.

In contrast, households in rural areas demonstrate considerably lower budget coefficients. In 2001, these expenditures amounted to 5.6%, followed by a modest increase to 6.3% in 2007 and 7.5% in 2014. Although these figures show an upward trend, the progression remains limited compared to urban areas. These results reflect the ongoing challenges faced by rural households, including limited access to healthcare services, poverty, and insufficient information on available healthcare resources.

Figure 1: Distribution of expenditures on hygiene and medical care by standard of living



Source: Authors' calculations based on data from ENCDM 2013-14, HCP

Figure 1 presents the distribution of the average annual expenditures per person (DAEP) on hygiene and medical care, broken down by quintiles of standard of living (C1 to C5) and the overall population average for 2014. This data provides an overview of spending disparities

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based on socio-economic status, revealing pronounced trends that prompt various academic interpretations.

Overall, there is a significant increase in expenditures on hygiene and medical care with rising standards of living. The lowest quintile (C1), comprising the poorest households, spends on average 130 dirhams on hygiene and 211 dirhams on medical care. In contrast, households in the highest quintile (C5) allocate 911 dirhams and 2,579 dirhams, respectively, to these expenses an increase of 600% for hygiene and over 1,000% for medical care. These gaps reveal deep inequalities in access to healthcare and basic hygiene products, which are directly correlated with the economic resources of households.

Analyzing hygiene and medical care expenditures separately shows that medical care accounts for a larger share of total expenditures across all categories. For instance, in quintile C1, the expenditure on medical care (211 dirhams) is nearly double that allocated to hygiene (130 dirhams). This trend is even more pronounced in quintile C5, where medical care expenses (2,579 dirhams) far exceed those for hygiene (911 dirhams). This suggests that medical care, often more costly and essential, absorbs a larger portion of household budgets, even among the wealthiest, while hygiene expenditures remain relatively stable.

The fact that average medical care expenditure in quintile C5 is nearly 12 times higher than that in quintile C1 indicates that wealthier households have a greater ability to access quality healthcare, including specialized or private services. This underscores a major equity issue in public health, as the most vulnerable households may face limited access to care due to financial constraints. These disparities call for public policies aimed at improving universal access to healthcare, particularly through targeted subsidies or public health programs adapted to low-income populations.

Examining the national average, hygiene expenditures per person amount to 421 dirhams, while medical care expenditures reach 965 dirhams. However, this average conceals significant disparities between quintiles, reinforcing the argument that average values do not fully capture disparities between social groups. On average, combined expenditures on hygiene and medical care total 1,386 dirhams, but this figure masks significant differences that should be considered in social and economic policy analyses.

The data in Figure 1 reveal striking inequalities in expenditures on hygiene and medical care based on the standard of living. Poorer households allocate a much smaller share of their budgets to these expenses compared to wealthier households. This uneven distribution highlights the need for targeted public policies aimed at reducing inequalities in access to

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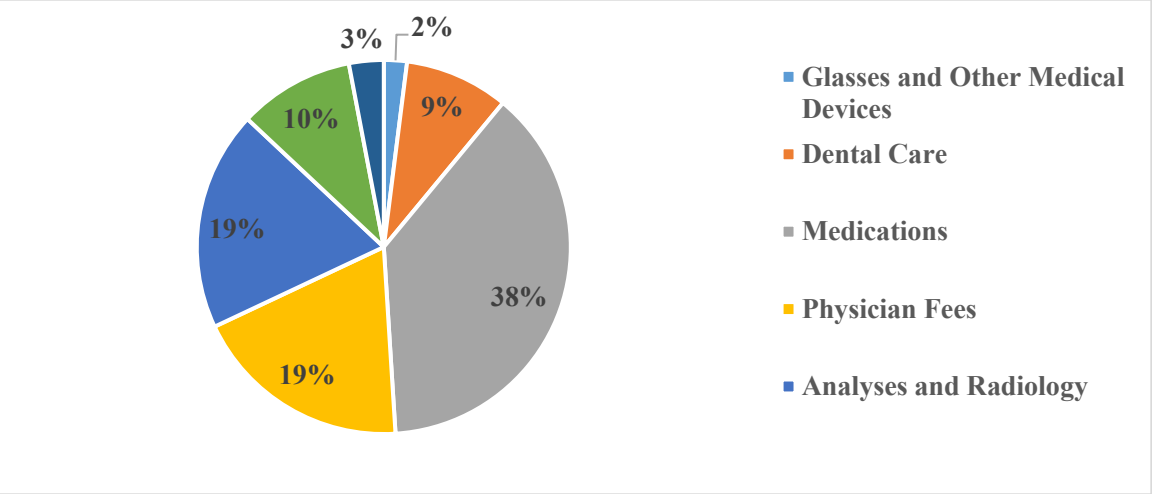
healthcare and promoting better hygiene, particularly for the most vulnerable groups in the population.

Figure 2 : Structure of health expenditures (in %)



Source: Authors' calculations based on data from ENCDM 2013-14, HCP

Medical care includes physician fees, laboratory tests, radiology, hospital care, dental care, and the purchase of medications, representing 69.6% of the expenditures in this category. As shown in Figure 2, an analysis of this sub-group indicates that the purchase of medications ranks first in the budget, with an average annual expenditure per person of approximately 386 DH, accounting for 38% of the total medical care expenditures. Physician fees and costs for laboratory tests and radiology rank second and third, respectively, each representing 19% of the expenditures.

1.2. Trends in children's education expenditures in Morocco

According to the results of the National survey on sources of income (ENSR) conducted between 2019 and 2020, over 61.5% of Moroccan households have school-aged children. On average, these households allocate an amount of 4 356 MAD per year to their children's schooling, across all educational levels. This amount represents about 4.8% of their total annual budget. These data highlight the significance of educational expenses in the budget of Moroccan households, thereby revealing the financial priorities regarding education within families.

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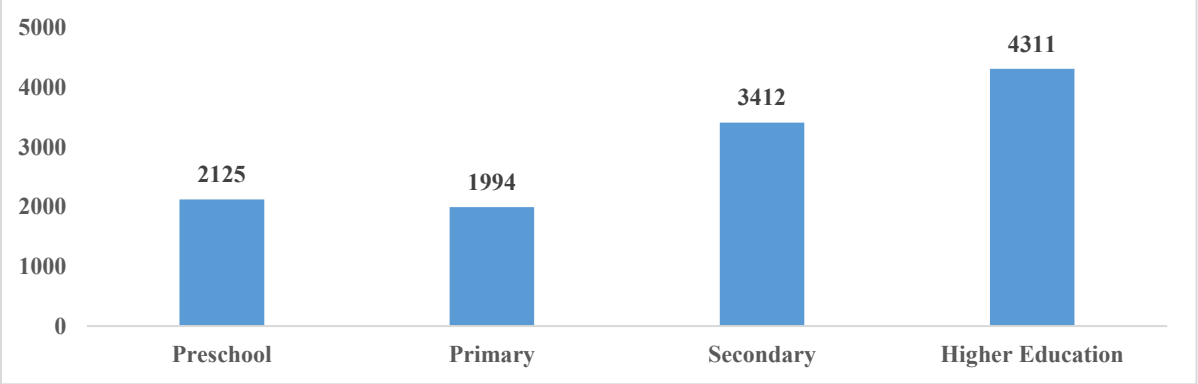
Figure 3 : Structure of annual household expenditures per enrolled child by level of education



Source: Authors based on data from the National Survey on Sources of Income (ENSR) 2019-2020, HCP

The analysis of annual household expenditures per enrolled child reveals significant variations depending on the level of education. On average, households spend 2125 MAD per child enrolled at the preschool level, indicating a relatively modest investment at this early stage of education.

At the primary level, the average expenditure per person is 1994 MAD, representing a slight decrease compared to the preschool category. This trend may reflect various factors, including potentially lower enrollment costs or educational needs at this stage.

In contrast, expenditures rise significantly at the secondary level, reaching 3412 MAD per enrolled person. This amount reflects the increased costs associated with educational resources, school supplies, and extracurricular activities at this level of education.

Finally, the average expenditure per enrolled person climbs to 4311 MAD, highlighting the need for substantial investment to access higher education. This can be attributed to the nature of tuition fees, books, transportation, and other associated costs that accompany university studies.

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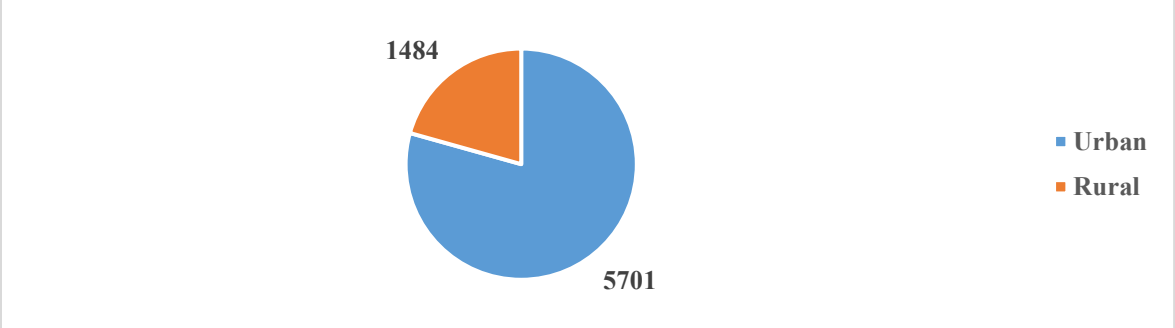
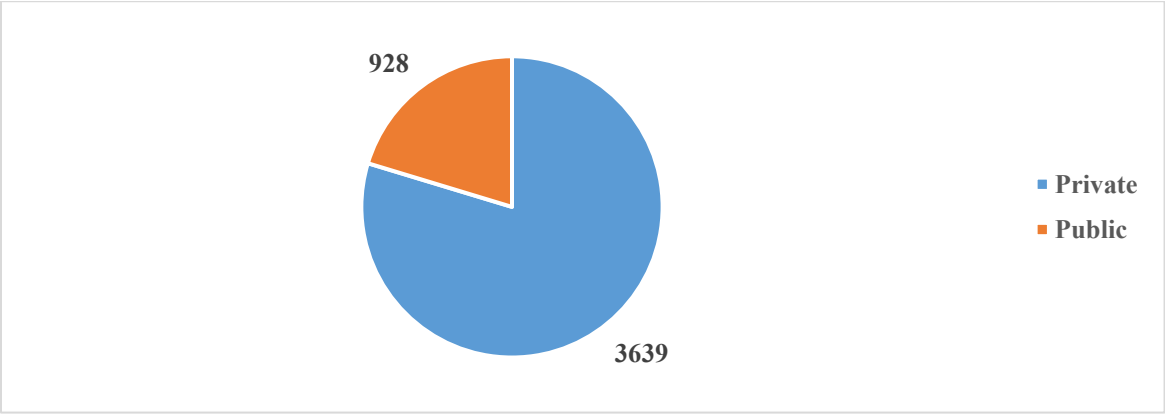
Figure 4 : Structure of annual household expenditures per enrolled child by place of residence



Source: Authors based on data from the National Survey on Sources of Income (ENSR) 2019-2020, HCP

The analysis of annual educational expenditures per enrolled child by place of residence highlights a significant disparity between urban and rural areas, as illustrated in Figure 4. In urban areas, households spend an average of 5701 MAD, reflecting better access to quality educational institutions and diverse educational resources. In contrast, in rural areas, the average expenditure is only 1484 MAD, illustrating economic constraints and limited access to educational resources.

Figure 5 : Structure of annual household expenditures per enrolled child by education sector



Source: Authors based on data from the National Survey on Sources of Income (ENSR) 2019-2020, HCP

The analysis of annual educational expenditures per student, categorized by the type of institution, as illustrated in Figure 5, shows a clear distinction between private and public sectors. On average, households spend 3639 MAD per student in private institutions, which reflects a significant investment in the perceived quality of education. Conversely, expenditures in the public sector only amount to 928 MAD, indicating possible budgetary constraints and

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limited resources within public educational establishments. This disparity highlights differences in educational quality and access, with private schooling demanding a higher financial commitment from families seeking enhanced educational outcomes for their children.

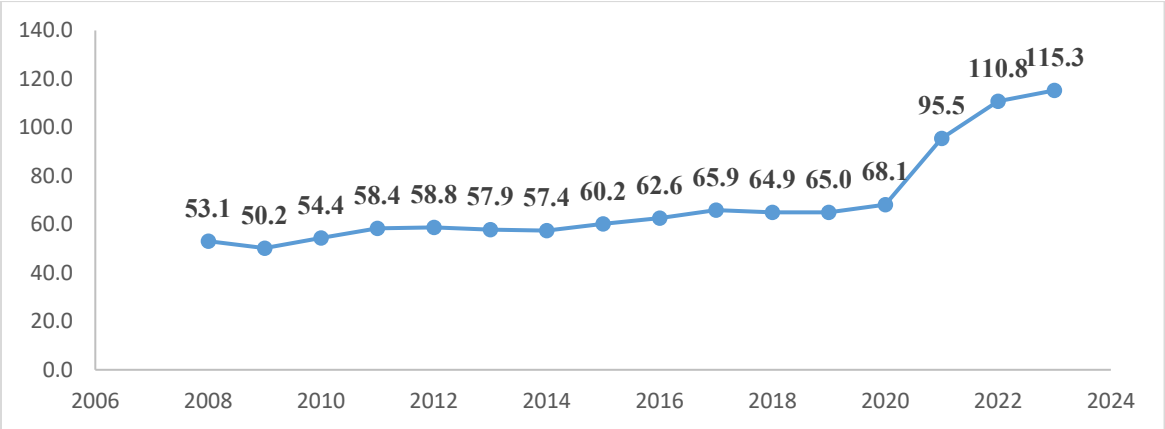
2. Evolution of remittances in Morocco

The global economy is subject to recurrent fluctuations that affect international financial flows, including remittances sent by migrants. For MRA, these remittances are a crucial source of income for families remaining in the country, while also playing a significant role in the Moroccan economy. This section aims to analyze the evolution of remittances from MRAs, focusing on two key dimensions: annual variations and monthly fluctuations.

2.1. Evolution of remittances from 2008 to 2023

The figure 6 illustrates the evolution of remittance flows to Morocco between 2008 and 2023, providing essential context for understanding the trends and fluctuations of these financial transfers over this period.

Figure 6: Remittances from Moroccans living abroad over the period 2008-2023



Source: Authors based on data from Office of Exchange 2023

The analysis of remittance data from Moroccan migrants for the period 2008-2023 reveals a general upward trend, with fluctuations influenced by global economic conditions. In 2008, remittances amounted to 53.1 billion MAD, followed by a slight decrease to 50.2 billion MAD in 2009. From 2010 to 2015, a gradual recovery was observed, reaching 60.2 billion MAD by 2015 (Ismaili Idrissi, 2020). Between 2016 and 2019, remittances continued to grow at a moderate pace, reaching 65.0 billion MAD in 2019.

Despite global challenges in 2020, remittances rose to 68.1 billion MAD, and in 2021 and 2022, there was a significant increase to 95.5 and 110.8 billion MAD, respectively, reflecting economic recovery and stronger support from migrants. In 2023, remittances reached a record

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high of 115.3 billion MAD, underscoring their growing importance for Morocco's economy and the crucial support they provide to households.

2.2. Monthly evolution of remittances for the period 2008 to 2023

The analysis of remittances from Moroccan migrants between 2008 and 2023 reveals a general trend of fluctuation, influenced by global economic conditions. In 2008, remittances amounted to 53.1 billion MAD, but a decline was noted in 2009, with monthly transfers not exceeding 4 billion MAD until June. Between 2010 and 2019, remittances saw an increase, particularly during July and August, coinciding with the return of Moroccan migrants for holidays and their spending on family-related events.

Table 2 : Monthly amounts of migrant remittances

	January	February	March	April	May	June	July	August	September	October	November	December
2023	9.445	7.996	10.109	8.400	9.332	10.415	10.260	12.004	9.033	9.518	9.172	9.576
2022	6.284	7.176	9.916	8.024	7.899	9.302	11.407	12.720	9.722	8.437	10.149	9.725
2021	6.894	6.809	8.016	8.124	7.580	7.941	9.972	10.289	8.300	7.477	7.161	6.917
2020	5.400	4.650	4.665	5.107	4.337	5.635	7.259	6.632	6.730	5.134	5.707	6.885
2019	5.429	4.557	5.324	5.331	5.342	5.026	6.456	7.130	5.087	5.379	4.710	5.245
2018	5.919	4.706	5.377	5.136	5.636	5.086	5.906	7.405	4.858	5.377	4.482	5.050
2017	4.754	4.163	5.251	4.496	5.842	5.004	6.272	8.743	5.336	5.546	5.283	5.210
2016	4.593	4.501	5.049	4.983	5.161	5.081	5.767	7.792	5.728	4.804	4.406	4.689
2015	4.572	4.259	4.827	4.653	4.730	5.017	6.034	6.623	5.500	4.753	4.227	4.962
2014	4.538	3.931	4.435	4.469	4.549	4.625	5.384	6.505	5.149	4.980	3.895	4.951
2013	4.759	4.255	4.414	4.787	4.880	4.497	5.504	6.464	4.749	5.211	3.855	4.489
2012	4.831	4.579	4.739	4.668	4.658	4.747	5.663	5.833	4.609	5.398	4.292	4.734
2011	4.268	4.003	4.508	4.334	4.824	4.838	6.350	5.439	5.334	5.078	4.706	4.705
2010	3.984	3.556	4.438	4.286	4.054	4.634	5.794	5.272	4.714	4.450	4.654	4.552
2009	3.775	3.255	3.532	4.012	3.707	4.279	5.984	5.026	4.121	4.203	4.165	4.152
2008	4.428	3.800	4.145	4.566	4.252	4.521	6.536	5.429	3.997	4.106	3.347	3.947

Source: Authors based on data from Office of Exchange 2023

In 2020, remittances were lower compared to previous years, but a gradual recovery occurred in 2021. In 2022, remittances reached their highest levels, indicating stabilization and

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adaptation to evolving global conditions. This evolution highlights the growing importance of remittances for the Moroccan economy and their crucial role in supporting households (Ismaili Idrissi, 2020).

3. Literature Review and Hypothesis Formulation

This section aims to explore existing academic work related to the impact of remittances on household expenditures, with a particular focus on children's health and education. A systematic review of the literature will identify key theories, empirical findings, and gaps in current research. By analyzing previous studies, we will gain a better understanding of how remittances influence household budgetary decisions, especially in terms of healthcare and education.

Based on the insights gained from this review, we will propose hypotheses to guide our empirical investigation. These hypotheses will be formulated considering the observed relationships in the literature, taking into account the specific contextual and socio-economic factors of Morocco.

3.1. Literature Review

Numerous studies have explored the impact of remittances on household decisions, particularly in education and health. Early work by Adams et al. (2008), analyzed data from Ghanaian households and demonstrated that remittances increased disposable income and health expenditures. Their findings revealed that families receiving remittances allocated a substantial portion of these funds to medical care, improving health indicators such as the frequency of medical consultations and access to medications. This research laid the groundwork for understanding the critical role of remittances in enhancing health outcomes.

Building on these insights, Adams & Cuecuecha (2010), expanded the scope by examining both internal and external remittances in Guatemala. Using data from the Instituto Nacional de Estadistica and employing a two-step selection model, their study revealed that remittances led to higher marginal spending on children's education.

In a follow-up study, Adams & Cuecuecha (2013), extended their analysis, examining how internal and external remittances influenced consumption and investment behaviors across different categories in Ghana. Using a two-step multinomial logit model to address selection bias in remittance receipt, their results confirmed that remittances significantly impacted spending on education. However, they also found a negative impact on other consumption expenditures, indicating that households receiving remittances prioritized educational investments over general consumption. This highlighted the nuanced role of remittances in

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shaping household financial decisions, with long-term investments such as education taking precedence.

A broader discussion of the role of remittances in economic development is provided by Ratha (2013). Although not an empirical study, Ratha's work emphasized how remittances support not only immediate family needs but also long-term expenditures, such as healthcare. His analysis, based on empirical observations, suggested that remittances play a crucial role in reducing inequalities in access to healthcare, particularly in rural and underserved regions. This perspective introduced the idea that remittances can serve as a tool for promoting equity in health access.

In contrast to earlier findings, Simiyu (2013), using panel data from 2007 and 2009 in Kenya's Rift Valley and Nyanza provinces, found mixed effects of remittances. While remittances had a positive impact on household consumption and health expenditures, they were associated with a decrease in the share of spending on education. Simiyu's use of a fixed-effects model provided valuable insights into the varying effects of remittances across different household expenditure categories, revealing that the impact of remittances is not uniform across all spending priorities.

A more comprehensive view of the role of remittances in healthcare was provided by Awojobi (2020), through a systematic literature review. Covering publications from 2002 to 2018, Awojobi concluded that remittances generally improved healthcare access and increased the use of medical services across several regions, including Africa, Asia, and Latin America. Although the magnitude of these effects varied, the findings underscored the role of remittances in addressing gaps in healthcare, particularly in low-income countries.

Continuing the focus on healthcare, Okey (2021) employed a binary logit model with instrumental variables to analyze the effects of remittances on education in Togo. His study revealed a positive impact of remittances on educational outcomes, with households receiving remittances able to allocate more resources toward schooling. This increased investment in education highlights the significant role remittances play in enhancing children's educational prospects in recipient households.

Pelenguei & Okey (2022), examined the relationship between remittances and health expenditures in Togo. Using data from the 2015 Basic Welfare Indicators Survey and a propensity score matching model, they found that remittances significantly increased access to public health services. This study further emphasized the role of remittances in strengthening healthcare access in low-income contexts, particularly in rural areas.

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Finally, Mishra et al. (2022) contributed to the literature with a study on remittances in Nepal. Utilizing OLS and instrumental variable methods, they found that remittances positively affected spending on food and education while reducing expenditures on alcohol and tobacco. Their analysis, based on data from the Nepal Living Standards Survey, highlighted how remittances shape household spending patterns, reinforcing the notion that remittances can lead to more productive and welfare-enhancing expenditures.

3.2. Hypotheses

In view of the various studies reviewed in the literature, it is evident that remittances play a crucial role in household expenditures on health and education, although their impact varies depending on economic, cultural, and geographical contexts. Based on these findings, it is pertinent to formulate specific hypotheses regarding the effect of remittances on households in both urban and rural settings. These hypotheses will guide the subsequent econometric analysis, taking into account the observed differences between these two environments.

Hypothesis 1: Migrant remittances have a positive impact on household health expenditures, with a more pronounced effect in urban areas than in rural areas.

Hypothesis 2: Households receiving remittances allocate a larger share of these funds to children's education expenditures compared to those not receiving such transfers, with a greater increase in educational expenditures in urban areas.

Hypothesis 3: The effect of remittances on healthcare use is significantly higher in urban areas due to better access to health infrastructure.

Hypothesis 4: Rural households receiving remittances are more likely to reallocate part of their expenditures towards long-term investments, such as education, compared to urban households.

4. Research methodology

Following a comprehensive review of both theoretical and empirical literature on the effects of migrant remittances on child education and household healthcare expenditures, this section presents an empirical analysis within the context of Morocco. Given its extensive diaspora, Morocco offers a pertinent case for examining how remittances shape various types of household expenditures. By considering the socio-economic and cultural characteristics specific to Morocco, this analysis aims to elucidate the influence of remittances on children's education and healthcare expenditures. Employing country-specific data, the study endeavors to assess the impact of remittances on the living conditions of Moroccan households.

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4.1. Data used

This study draws upon a comprehensive review of both theoretical and empirical literature to investigate the impact of remittances on children's education and healthcare expenditures in Morocco. An econometric model is employed, utilizing data from the National Survey on Household Consumption and Expenditure (ENCDM), conducted by the High Commission for Planning (HCP) during the 2013-2014 period. The survey's findings indicate that out of 15,970 households surveyed, 1,707 reported receiving remittances, accounting for approximately 10.68% of the sample. This underscores the significance of remittance flows in the Moroccan context. By analyzing these data, this paper aims to elucidate the relationship between remittances and expenditures on children's education and healthcare, thereby contributing to a deeper understanding of their role in enhancing household welfare.

4.2. Descriptive analysis of variables

Table 3 provides socio-demographic, socio-economic and geographical characteristics of households that received remittances from the MRA, and households that did not receive remittances from the MRA.

Table 3 : Characteristics of variables of households

Variables	Did not receive remittances	Receive remittances
Gender		
Female	16,96 %	28,30 %
Male	83,04 %	71,70 %
Age Group		
Under 34 years old	10,42 %	7,26 %
34-44 years old	20,91 %	14,24 %
45-54 years old	26,38 %	24,55 %
55-64 years old	23,83 %	26,30 %
Over 65 years old	18,46 %	27,65 %
Marital status		
Single	3,46 %	4,45 %
Married	81,57 %	73,29 %
Divorced	3,10 %	4,28 %
Widowed	11,86 %	17,98 %
Educational level		
Without education level	52,83 %	46,57 %
Primary	32,18 %	33,98 %

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Secondary	8,92 %	11,95 %
Higher	6,07 %	7,50 %
Professional status		
Employer	2,53 %	2,28 %
Self-employed	34,16 %	24,84 %
Employee	38,55 %	29,17 %
Apprentice, Family helper	0,32 %	0,29 %
Unemployed	24,44 %	43,41 %
Area of residence		
Urban	63,82 %	74,87 %
Rural	36,18 %	25,13 %
Region		
Tangier-Tétouan-Al Hoceima	10,56 %	10,78 %
Oriental	6,84 %	15,93 %
Fès-Meknès	12,40 %	12,42 %
Rabat-Salé-Kénitra	13,44 %	14,18 %
Beni Mellal-Khenifra	8,48 %	9,55 %
Casablanca-Settat	19,34 %	19,51 %
Marrakech-Safi	11,67 %	5,27 %
Daraa-Tafilalet	3,98 %	3,51 %
Sous-Massa	7,41 %	6,68 %
Southern regions (two regions)	5,90 %	2,17 %

Source: Authors' calculations based on data from ENCDM 2013-14, HCP

Households headed by men represent 71.7% (1,224 men) of those receiving remittances, whereas only 28.3% (483 women) are led by women. Age plays a significant role in remittance receipts, with the percentage of households receiving remittances increasing with the age of the head. For instance, 7.3% of household heads under the age of 34 receive remittances, while this rises to 26% for those aged 55-64, and 28% for those over 65. In contrast, 26.38% of households not receiving remittances are headed by individuals aged 45-54.

Marital status appears to have a minimal effect on remittance patterns. Married household heads account for 73% of those receiving remittances, followed by 18% for widowed heads. Single and divorced individuals make up smaller shares, at 5% and 4%, respectively. Similar proportions are seen among households not receiving remittances.

Educational attainment also shows clear trends, with 47% of household heads receiving remittances having no formal education, and 34% having completed only primary education.

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Employment status further distinguishes these households, as 43.41% of those receiving remittances are unemployed, compared to 38.55% among those not receiving remittances. Geographically, 25% of remittance-receiving households are in rural areas, while 75% are urban-based. Regionally, around 20% of household heads in the Casablanca-Settat region a key economic zone received remittances, compared to 19% who do not.

4.3. Correlation of variables

To refine the model specification, it was essential to examine the correlation between the variables included in the model. The presence of correlation between variables is indicated by a linear relationship between them. Table 4 presents Pearson's correlation coefficients, which measure the linear association between the dependent variable (remittances) and the set of independent variables (characteristics of the Head of Household) incorporated in the econometric analysis.

The use of Pearson correlation in econometric analysis is valued for its ability to measure the strength and direction of linear relationships between variables. Appropriate for variables on interval or ratio scales, it clarifies correlation coefficients, where values close to 1 or -1 signal strong positive or negative correlations, and values close to 0 indicate the absence of a linear relationship. Its application in the analysis of the impact of remittances on children's health and education spending is crucial for detecting significant influences on the dependent variable, establishing a basis for the econometric model and facilitating understanding of the dynamics.

Table 4 : Matrix of Pearson Correlation Coefficients

Variables	Remittances	Gender	Age	Marital status	Educational level	Professional status	Area of residence	Region of residence
Remittances	1.000							
Gender	0.0974 0.0000	1.000						
Age	0.0731 0.0000	0.1300 0.0000	1.000					
Marital status	0.0403 0.0002	0.7317 0.0000	0.2932 0.0000	1.000				
Educational level	-0.0509 0.0006	0.0281 0.0091	-0.1146 0.0000	-0.0765 0.0000	1.000			

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Professional status	0.0802 0.0000	0.2939 0.0000	0.5321 0.0000	0.3159 0.0000	0.0002 0.9876	1.000		
Area of residence	-0.0412 0.0002	-0.1153 0.0000	-0.0051 0.5216	-0.0619 0.0000	-0.2903 0.0000	-0.1244 0.0000	1.000	
Region of residence	-0.0365 0.0009	-0.0004 0.9608	-0.0853 0.0000	-0.0099 0.2091	0.0231 0.0317	-0.0365 0.0000	-0.0969 0.0000	1.000

Source: Authors' calculations based on data from ENCDM 2013-14, HCP

The analysis of correlations between remittances and other variables reveals generally weak relationships. A slight positive association is observed between remittances and the gender of the household head, indicating a marginal influence. Additionally, remittances show a slight increase with the age of the household head, while marital status has a minimal impact. A negative trend is found with respect to educational level, suggesting that households with higher levels of education may be less reliant on remittances. The professional status of the household head demonstrates a weak positive correlation, implying that those who are employed tend to receive slightly more remittances. In contrast, both the area and region of residence display a negative correlation with the remittances received, indicating that households located in certain areas or regions are likely to receive fewer remittances.

5. Econometric model and results

5.1. Econometric model used

In this section, remittances are considered as an intervention whose effect on expenditures needs to be evaluated. A major challenge of this approach lies in the fact that the assignment of individuals to treatment and control groups is not done randomly. This lack of randomization can lead to a biased estimation of the average effect of the intervention due to the presence of confounding variables. In other words, unobserved factors influencing expenditures could also affect the likelihood of receiving remittances, complicating the matching between treatment and control groups, particularly when managing a set of characteristics in N dimensions.

To address these difficulties, some researchers turn to the use of instrumental variables. However, identifying and validating an adequate instrument presents its own challenges. Selecting an instrumental variable that is both strongly correlated with the receipt of remittances but not with the errors in the equations of children's education and household healthcare expenditures requires careful and thorough analysis. This strategy is crucial for isolating the causal effect of remittances on measures of economic interest while minimizing biases associated with confounding variables and unobserved factors.

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To tackle the potential bias resulting from unobserved heterogeneity, the propensity score matching method offers a viable solution by condensing the treatment characteristics of individuals into a single index metric. Introduced by Rosenbaum & Rubin (1983), propensity score matching is a quasi-experimental technique that employs statistical methods to create a synthetic control group. This is done by pairing each treated individual or unit with an untreated unit that has comparable characteristics. In this study, the application of PSM involves matching each household receiving remittances from a MRA with a household that did not receive remittances but displayed similar demographic, socio-economic, and geographical attributes. This process thus generates a comparison sample, allowing for a more rigorous analysis of the impact of remittances on the variables of interest, such as health and education expenditures.

This approach enables the calculation of robust estimates to determine the impact of remittances on children's education and household healthcare expenditures. Fundamentally, this method allows for the construction of counterfactuals to understand what would happen to the expenditure level of a household receiving remittances if it were not receiving them.

In matching estimators, two important assumptions are formulated: the conditional independence assumption (CIA) and the common support condition. $\boldsymbol{P_i^1}$represents the value of $\boldsymbol{P}$ if the head of household receives remittances, while , $\boldsymbol{P_i^0}$represents the value when the head of household does not receive remittances. These two assumptions can be formally expressed as follows:

$$\left(\boldsymbol{P_i^1}, \boldsymbol{P_i^0}\right)_{\boldsymbol{T_i}} \boldsymbol{I}\, \boldsymbol{X_i} \quad (1)$$

$$\boldsymbol{0 < P(T_i = 1 I\, X_i) < 1} \quad (2)$$

Where $\boldsymbol{T}$ is a dummy variable indicating that the household receives remittances ($\boldsymbol{T=1}$ indicates receipt of remittances), and $\boldsymbol{X}$ is a set of demographic, socio-economic, and geographical variables.

Both assumptions must be satisfied: the first assumption implies that selection is based solely on the observed characteristics $\boldsymbol{X}$, while the second ensures that for each treated household, there exists a control household identified using the same observed variables, exhibiting strong similarities or closeness as measured by the propensity scores. However, these variables are not used to measure impact. In this specific case, the selected variables include: the gender and age of the head of household, marital status, educational level, profession, and place and region of residence.

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Nonetheless, there are computational issues due to dimensionality. To mitigate these problems, Rosenbaum & Rubin (1983), propose constructing a statistical comparison group by estimating a propensity score (the probability of observations receiving remittances) given the set of covariates $\boldsymbol{X}$.

Based on the propensity score, the groups receiving remittances and those not receiving them are matched. The two assumptions of conditional independence and common support imply that:

$$\left(\boldsymbol{P_i^1}, \boldsymbol{P_i^0}\right)_{\boldsymbol{T_i}} \boldsymbol{I}\ \boldsymbol{P}(\boldsymbol{X_i}) \quad (3)$$

$$\boldsymbol{0 < P(T_i = 1 I\ I\ P(X_i)\ ) < 1} \quad (4)$$

Where $\boldsymbol{P}(\boldsymbol{X_i})$ is the propensity score representing the probability of observations receiving remittances given $\boldsymbol{X_i}$. This matching method is known as propensity score matching. Fundamentally, this method implies that if remittances are independent of the observable covariates $\boldsymbol{X_i}$, they should be independent of $\boldsymbol{P}(\boldsymbol{X_i})$. The dimensionality problem is thus reduced to a single dimension. There is no matching issue, as observations with the same propensity score have the same distribution of the covariate vector$\boldsymbol{X}$.

The propensity score is calculated using a Probit model incorporating all observable covariates likely to determine the receipt of remittances. For each observation (T=1 and T=0), the probability of receiving remittances is estimated, followed by testing the balancing property $\boldsymbol{\widehat{P}(XIT = 1) = \widehat{P}(XIT = 0)}$.

As suggested by Heckman et al. (1997), certain observations in the control group with weak common support are dropped to make causal inferences. If the balancing property is not satisfied, additional specifications of higher-order terms and interactions of the covariates are included in the Probit model until the balancing property is satisfied. After estimating the propensity scores and verifying the satisfaction of the balancing property, a non-parametric univariate regression is conducted to determine the average treatment effect on the treated (ATT) between households benefiting from remittances and those that do not. This estimation is defined as follows:

$$\boldsymbol{ATT\ = E\Delta_{iTi} = 1 = EP_i^1 - P_{iTi}^0 = 1 = EP_{iTi}^1 = 1 - EP_{iTi}^0 = 1} \quad (5)$$

Three matching methods are employed to obtain a robust estimate of the treatment effect on the treated (ATT). The first method is nearest neighbor matching, which pairs households receiving remittances with non-receiving households that have the most similar propensity scores. The second method, kernel matching, calculates a weighted average of non-receiving households to

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create a counterfactual group for each household receiving remittances. The third method, stratification, divides observations into different strata, allowing treated observations to be matched with similar control observations within each stratum.

5.2 Analysis and discussion of results

Low-income households often face significant financial constraints that hinder their ability to finance their children's education or adequately address the healthcare needs of their family members.

The impact of remittances on education was assessed by analyzing the school enrollment rate among children aged 6 to 14. Meanwhile, the impact on health is evaluated through the rate of medical consultations for all individuals, regardless of age, who reported experiencing illness or injury in the two months preceding the survey. This approach allows for a comprehensive understanding of the extent to which remittances contribute to improving educational access and healthcare utilization in low-income households.

Table 5 : Impact of remittances on access to healthcare by area of residence

Area of residence	Medical-health consultation rate (%)
Urban	
Receive remittances	88,9
Did not receive remittances	88,0
average effect	0,9
Rural	
Receive remittances	79,9
Did not receive remittances	78,9
average effect	1,0
Total	
Receive remittances	86,5
Did not receive remittances	86,3
average effect	0,2

Source: Authors' calculations based on data from ENCDM 2013-14, HCP

The table provides a comparative analysis of the rate of medical consultations based on the area of residence and whether households receive remittances. The data are segmented into urban and rural households, as well as the overall population. The results demonstrate a modest but consistent positive effect of remittances on healthcare use.

In urban areas, the medical consultation rate has reached 88.9%, by households receiving remittances compared to 88.0% for those not receiving remittances. This indicates an average

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effect of 0.9%, suggesting that remittances have a marginal influence on the likelihood of seeking medical care in urban areas. While the effect is relatively small, it implies that remittance-receiving households may have slightly better access to healthcare services, or that they have the financial means to afford medical consultations.

In rural areas, the average medical consultation rate for remittance-receiving households is 79.9%, compared to 78.9% for those without remittances, resulting in an average effect of 1.0%. This effect is slightly higher than that observed in urban areas, indicating that remittances might play a more significant role in enabling rural households to seek medical care. Given that rural households often face additional barriers to accessing healthcare, such as distance to medical facilities and higher poverty levels, the presence of remittances may provide a critical financial cushion that increases their ability to afford medical consultations.

When considering the total population, the rate of medical consultations is 86.5% for those receiving remittances, as opposed to 86.3% for non-receiving households, leading to an overall average effect of 0.2%. This minimal difference suggests that, on a national scale, the impact of remittances on healthcare consultation rates is relatively small. However, the slight increase in consultation rates among remittance-receiving households does indicate that remittances have a positive effect on healthcare access, even though its limited scope.

Overall, the table reveals that remittances slightly enhance the likelihood of seeking medical care, particularly in rural areas. This effect may be attributed to the increased financial capacity provided by remittances, allowing households to overcome cost barriers associated with healthcare services. While the overall effect size is small, the findings suggest that remittances contribute to improving healthcare access, especially among more financially constrained households.

Table 6 : Impact of remittances on children's education by area of residence

Area of residence	Education rate for children aged 6-14 (%)
Urban	
Receive remittances	98,2
Did not receive remittances	96,5
average effect	1,7
Rural	
Receive remittances	91,5
Did not receive remittances	86,3
average effect	5,2

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Total	
Receive remittances	96,1
Did not receive remittances	93,9
average effect	2,2

Source: Authors' calculations based on data from ENCDM 2013-14, HCP

The table provides a detailed breakdown of the impact of remittances on the education rate of children aged 6 to 14, based on their area of residence urban or rural and across the overall population. The findings indicate that remittances positively influence school enrollment rates, with varying effects depending on whether households are in urban or rural areas.

In urban areas, the education rate for children aged 6 to 14 in households that receive remittances stands at 98.2%, compared to 96.5% in households that do not receive remittances. The average effect of remittances is 1.7%, suggesting a modest but notable improvement in school enrollment for children in urban households receiving remittances. This increase may be attributed to the financial support provided by remittances, which can help cover educational costs such as tuition fees, school supplies, and transportation. While the difference is small, it highlights that remittances play a supportive role in facilitating better access to education for urban children, potentially reducing the risk of dropout or irregular school attendance.

The effect of remittances on education is more pronounced in rural areas. Here, the education rate for children in households receiving remittances is 91.5%, whereas it drops to 86.3% for those not receiving remittances. This results in an average effect of 5.2%, indicating a stronger positive impact of remittances on school enrollment in rural setting areas. The larger effect size in rural areas may be due to the greater financial constraints faced by rural households and the higher relative value of remittances. In many rural areas, access to educational facilities is more limited, and the costs of schooling, relative to income, are more burdensome. Therefore, remittances can play a crucial role in enabling families to overcome these barriers and ensure their children's regular school attendance.

Considering the total population, the education rate for children aged 6 to 14 in remittance-receiving households is 96.1%, compared to 93.9% for non-receiving households. The average effect of 2.2% indicates that remittances contribute to a higher rate of school enrollment across all regions. This effect underscores the overall positive impact of remittances on educational attainment, which is particularly beneficial for lower-income families that may struggle to afford educational expenses without additional financial support.

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The table reveals that remittances have a clear, positive impact on child education rates, with the most significant effects observed in rural areas. The financial support provided by remittances seems to alleviate the cost barriers associated with schooling, such as fees, supplies, and transportation, which in turn promotes higher enrollment rates. This effect is more marked in rural areas due to the more significant financial constraints and limited access to education. In urban settings, while the effect of remittances is smaller, it still enhances educational access, possibly by enabling families to afford better-quality schooling or ensuring that children remain enrolled.

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Conclusion

This article has thoroughly examined the impact of remittances from MRA on child education and household healthcare expenditures in Morocco. The results of the analyses show that these remittances play a crucial role in improving the living conditions of recipient households, both in urban and rural areas. In particular, the data reveal that households receiving remittances have better access to medical care and education, with significant effects observed in rural areas where access to these services may be more limited.

In urban areas, remittances contribute to a slight increase in the rates of medical consultations and children's education, suggesting that while access is generally better in urban settings, remittances play an important role in covering additional expenses and improving living conditions. In contrast, in rural areas, the effects are more pronounced: households receiving remittances show significantly higher education and medical consultation rates than those not receiving them. This highlights not only the role of remittances as a source of income but also their ability to bridge gaps in basic services in areas where resources are often limited.

The hypotheses proposed at the beginning of this study are largely confirmed by the results. Remittances positively impact both health and education expenditures, with more pronounced effects in rural areas, validating most of the proposed hypotheses.

Remittances thus serve as an additional source of income that helps reduce financial barriers associated with essential expenditures such as health and education. They appear not only as a mechanism for economic support for households but also as a significant vector for economic stabilization and social well-being, especially in a context where socio-economic inequalities persist. The positive impact of remittances on access to healthcare and education underscores their role in improving human development indicators, as well as their potential to strengthen household resilience in the face of economic crises.

To maximize these benefits, it is crucial to adopt public policies that support remittances. This includes reducing transaction fees and improving transfer channels, which could facilitate the sending of money by migrants. Moreover, the development of targeted programs that integrate remittances into educational and health initiatives could direct these resources toward beneficial investments for children and families. Subsidies for school fees or preventive health programs, funded by remittances, could significantly improve living conditions.

Additionally, it is imperative to raise household awareness about the importance of investing remittances in critical areas such as education and health. Information campaigns could play a key role in encouraging prudent financial management of these resources. Furthermore,

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supporting local initiatives that enhance access to quality services by channeling remittances toward community projects could have positive effects on local development.

Finally, research and follow-up studies should be conducted to assess the long-term impact of remittances on health and education. This will allow for adjustments to policies and programs based on observed outcomes, ensuring that the benefits of remittances are maximized.

In summary, remittances from migrants constitute a valuable resource for Morocco, both for recipient households and for the overall socio-economic development. A strategic and integrated approach could enhance their potential and contribute to a more prosperous future for generations to come.

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