© *The Pakistan Development Review*
60:2 (2021) pp. 175–199
DOI: 10.30541/v60i2pp.175-200

Remittances and Healthcare Expenditures: Evidence from Pakistan

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This study, examines the effect of remittances on healthcare expenditure in Pakistan by utilising the Pakistan Social and Living standards Measurement (PSLM) survey. The total healthcare expenditure is classified into two categories, i.e. expenditure on medicines and expenditure on clinical services. The study analyses these categories in case of both rural and urban areas of the country. Such data is generally characterised by selection bias; therefore, we employ Propensity Score Matching (PSM) instead of the commonly used econometric techniques. Findings of the study indicate that remittances enhance spending on both the clinical services and medicines. This result is robust across the urban and rural areas of Pakistan. The comparison between the clinical services and medicines shows that the impact is higher on clinical services as compared to the impact on medicines. This suggests that remittances help to improve the preventive nature of health outcomes in Pakistan.

JEL Classification: D10; I21; O15
Keywords: Remittances, Healthcare Expenditure, Medical Expenditure, Clinical Expenditure, Propensity Score Matching

1. INTRODUCTION

Over the time, labour market has been globalised and, as a result, migration for employment has increased. Accordingly, remittances have emerged as important source of income, especially in developing countries, which play an important role in enhancing consumption, private investment, education and health expenditure etc. (Ruiz-Arranz and Giuliano, 2005; Mundaca, 2009; Ahmed, et al. 2018). According to the World Migration Report (2020), the world's migrant population is estimated at around 272 million in 2019, which comprises 3.5 percent of the world's population. Likewise, during the last decade, we have experienced 2.3 percent growth in world's migration which constitute as twofold of that of the previous decade, implying an increasing trend in world migration. Consequently, the inflow of remittances to the receiving countries has also been increasing. In 2018, the inflow of global remittances was $689 billion, out of which $529 billion was directed to the low and middle-income countries. This large amount of transfers has clear implications for the overall economic development of receiving

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countries; however; it largely depends on the household contexts, community circumstances, and the way decisions are made (Adams and Page, 2005; Kalaj, 2015). Pakistan is no exception in this regard. In 2019, the migrants from Pakistan were around 6.3 million which roughly constitute as 2.9 percent of the country's population. In 2019, according to the World Bank (2019), the receipts of remittances to Pakistan was approximately $22 billion which places Pakistan in the top ten remittance-receiving countries. Given the importance of remittances for Pakistan, a considerable research has been conducted to explore the macroeconomic impact of remittances.[1] For instance, most of the existing research has been conducted in the context of rising remittances and its relationship to consumption expenditure, poverty, economic growth etc. To our knowledge, we are the first to study the impact of remittances on health care expenditure in Pakistan from micro perspective.

With regard to the impact of remittances on healthcare expenditure; there are a few studies available in the existing literature which claim that remittances enhance healthcare expenditure (Amuedo-Dorantes and Pozo, 2011; Jorge, 2008; Clement, 2011; Kalaj, 2015). In general, remittances affect the health of households in several ways. First, remittances relax the credit constraint of households which, in turn, results in the increase in healthcare expenditure of the households (Lopez, et al., 2007). Indirectly, migration increases the awareness and knowledge about the health standards and, thus, enhances the direct effect of remittances on health (Lindstrom and Munoz-Franco, 2006; Hildebrand and McKenzie, 2005). Health, as a key element of human capital and future productivity, has significant implications for economic prosperity and poverty alleviation (Grossman, 1972). In general, individual's demand for health is directly related with their incomes. In this study, we intend to examine whether this direct relationship holds for remittances? Arif (2004) studies the impact of remittances on health-related activities in Pakistan. Abbas, et al. (2014) make similar attempt by looking at their implications for healthcare expenditure. However, these studies are characterised by smaller sample size and are only restricted to rural areas. In addition, these studies have selection-bias problem due to the omission of observable characteristics of households.

Keeping in view these problems, we study the effect of remittance on households' healthcare expenditure at micro-level. We decompose this impact into two categories. First, we study the implications of remittances for households' clinical expenditure which comprises annual fees paid to specialists, doctors, Hakeem/Midwives, laboratory test, hospital charges, etc. Second, we analyse the effect of remittances on the expenditure of households on medicine which includes the annual expenses on the purchase of medical apparatus, vitamins, equipment or supplies and medicines etc. In order to do this analysis, we use Pakistan Social and Living Standards Measurement (PSLM) (2011-12) survey by employing the approach of Propensity Score Matching (PSM). In order to see the effects of regions, we separately analyse the urban and rural areas in terms of healthcare expenditure. Rest of the study is categorised into four sections. Section 2 discusses the relevant literature. Methodology, the construction of variables and Data have been discussed in Section 3. Section 4 shows the main results along with the discussions on those results while Section 5 concludes the study.

[1] See, for instance, Bilqees and Hamid (1981), Arif (2004), Abbas, et al. (2014) etc.

2. REVIEW OF LITERATURE

In general, health is considered as an asset which can be produced. So, the production of health is an investment which counter-balance the consumption of capital (Zweifel, et al. 2009). The spending in health is rewarded by the reduction in time spent in bad health. Thus, the demand for medical care is a derived demand which can be perceived in similar pattern as the demand for other commodities (Grossman, 1972).[2] Households spend on the health services only if such spending is relatively advantageous compared to the spending on other commodities. Alternatively, households spend on health services if the job hours saved due to good health are more beneficial as compared to the amount spent on healthcare expenditure (Zweifel, et al. 2009). Thus, as investment, cost-benefit analysis is done for health just like other investment projects. In addition to the pricing and earning strategies, there are many other demographic characteristics which determine health demand like the household structure; family, economic and social contexts; structure of the market for workers and wages; government institutional structure etc. (Ke, et al. 2011). Parental education is also important among the other determinants of health demand. Toor and Butt (2005) find that the parents with higher level of education are likely to take more care of their children, resulting in better health services for their kids.[3] Groot, et al. (2006) assert that parental education indirectly affect health demand through its effect on children's education.[4] With regard to regional effects, Hotchkiss, et al. (1998), while matching the budgetary position, find that in urban areas the healthcare expenditures are relatively small as compared to the rural areas.

There is considerable research which focuses on the impact of migration or remittances on the provision of healthcare or healthcare spending.[5] Lindstrom and Munoz-Franco (2006) find that remittances enhance healthcare expenditure in Guatemala.[6] Alternatively, remittances relax the credit constraint and, accordingly, remittances receiver households are likely to spend more on health care. Amuedo-Dorantes and Pozo (2011) got similar results in case of Mexico.[7] Likewise, in case of Mexico, Valero-Gil (2009), finds that households which have no access to employment medical services spend 11.3 percent of the increase in remittances on health care as compared to 8 percent for those which have approach to employment medical services.[8]

[2]The Grossmann's model is a benchmark model of the demand for healthcare expenditures. According to the model, individuals demand high quantity of health services if the labour wages and health capital are high. Moreover, there is indirect relationship between the demand for health services and their prices. Likewise, the education level has a negative relationship and age has a positive relationship with quantity demanded of health services.

[3]For instance, due to parental care, the incidence and length of illness is significantly decreasing. Likewise, parental education increases the trust on modern medical treatments as compared to outdated medicines. See, also, Odubunmi and Abidogun (2013), Groot, et al. (2006) for the details.

[4]Alternatively, parental education indirectly affects the demand for health by taking into account the implications of better health for educational success of the children.

[5]See, for instance, Lindstrom and Munoz-Franco (2006), Amuedo-Dorantes and Pozo (2011), Jorge (2008), Drabo and Ebeke (2011), Clement (2011) etc.

[6]In particular, the effect in the rural areas of Guatemala is larger.

[7]The decomposed analysis of Amuedo-Dorantes and Pozo (2011) shows that the healthcare expenditure is less sensitive to remittances in the lower-income households. However, households which lack healthcare coverage show higher response to remittances. See also Frank, et al. (2009) for the case of Mexico.

[8]These referred to various benefits for permanent employees provided after their regularisation. It is based on medical coverage for employee and her/his dependents.

In a similar study, Jorge (2008) concludes that, in the absence of workers' insurance policies for the clinical services, almost 10 percent of the increase in migrants' remittances are allocated to expenditure on healthcare services. In a slightly different study, Drabo and Ebeke (2011) find that foreign aid, public health spending, and remittances play key role in the access to healthcare services in developing countries. In this regard, remittances lead to a sectoral glide to the private sector from the public sector for the richest and intermediate income classes. In sharp contrast to the above studies, Ponce, et al. (2011) concludes that remittances enhance the total consumption and healthcare expenditure; however, they have no significant effect on child health. As we can see, most of the existing literature asserts that remittances enhance healthcare expenditure and, thereby, have significant impact on the health status of the members of the households living in the home country.

Similar attempts have been made in Pakistan in order to analyse the effect of remittances and migration on healthcare expenditure. For instance, Arif (2004) analyses the impact of migration on health-related activities by controlling for other demographic and socio-economic characteristics of households.[9] The study finds that the infant mortality rate is higher in households which have migrants; and this effect is larger for female kids. With regard to remittances, Abbas, et al. (2014) find that remittances enhance total expenditures on food, education and health in Punjab, Pakistan. In contrast to these two studies, Bilqees and Hamid (1981) find that the remittances result in the reduction of poverty in general; however, its impact on health is negligible as there is significant difference between the migrants and non-migrants households in terms of healthcare expenditure. In this study, we use a larger sample and incorporate both the rural and urban areas. Also, we take significant care for sample selection bias and endogeneity issues by employing the approach of Propensity Score Matching (PSM).

3. DATA AND METHODOLOGY

This section throws light on the characteristics of data along with the methodological framework for analysis. In particular, this section explains the quasi-experimental approach. Finally, the section explains variables, including both the dependent and explanatory variables.

3.1. Description of Data

We use Pakistan Social and Living standards Measurement (PSLM) survey, 2011-12, in order to draw data for our analysis.[10] PSLM includes data on a variety of aspects including income, education, employment, health and migration at provincial and national levels. Thus, it is one of the most suitable nationally representative surveys in order to examine the effect of remittances on expenditures on healthcare in Pakistan. There are separate questionnaires for males and females. Females' questionnaire gathers information related to health, maternity history, pregnancy (for married females of 15-49

[9]The analysis is based on the data from Pakistan Socio-economic Survey (PSES) for 2001. The study focus on migration instead of the amount of remittances received from the migrants.

[10]Pakistan Bureau of Statistics (PBS) conduct PSLM.

years of age), family planning, reproductive health etc. besides demographic and socio-economic information of the females. Likewise, males' questionnaire gathers information on household expenditure, socio-economic and demographic characteristics of the households etc. PSLM 2011-12 covers a sample of about 15807 households which are distributed over 1158 Primary Sampling Units (PSUs) (585 urban and 573 rural). According to the survey; 861 are remittances-receiving households which constitutes as 5.4 percent of the total households. 358 (41.6 percent) of these households are from the urban areas while 503 (58.4 percent) are from the rural areas. During 2011-12, sickness or injury is observed in 7 percent of the total population. Around 96 percent of the total injured or sick households had experienced some health consultations, out of which 22 percent benefited from public facilities (i.e., hospitals, Rural Health Centers (RHCs), dispensaries, and Basic Health Units (BHUs) while 71 percent availed private hospitals/dispensaries.

A brief comparison of remittances-receiver and non-receiver households in terms of socio-economic characteristics is shown in Table 1. The household size for both the remittances-receiver and non-receiver households is similar in urban areas; however, it is significantly different in case of rural areas and the whole sample. Remittance-receiver households have a higher proportion of female heads (43 percent) than non-receiver households (8 percent). This proportion largely remains the same across the rural and urban areas of the country. With respect to age of the households' heads, heads of remittance-receiver households are older than those of non-receiver households. The proportion of uneducated heads are higher in remittance-receiving households as compared to non-receiving households, but this difference is significant only in case of the whole sample and that of the urban areas. Remittance-receiving households have higher healthcare expenditure than non-receiving households for the whole sample as well as for the rural and urban areas. The total health expenditure at the disaggregate level, in terms of medicine expenditure and clinical expenditure, also shows significant differences between non-receiving and receiving households. Finally, remittance-receiver households are higher in Punjab (51 percent) followed by KPK (45 percent).

3.2. Method for Measuring Impacts

There are two approaches to measure impacts, i.e. experimental and non-experimental. In our case, due to the unavailability of data for experimental approach, we opt for quasi-experimental approach which is the most used method of non-experimental approach.[11] In quasi-experimental approach, the quasi-experiment is likely to produce an associated control group by questioning: "what the treatment group may have done if the treatment was not done?" (Armendariz and Morduch, 2010). The randomisation procedure in quasi-experimental approach is done in such a way that all the observed and unobserved characteristics except the treatment are similar for both the control and treatment groups (Rosenbaum and Rubin, 1983; Bryson, et al. 2002). There are three different methods in this approach: Before-After Difference Estimator (BADE); Matching Estimator; and Difference in Difference Estimator (DID). We avail matching

[11]In fact, in impact-evaluation, the non-experimental programs are relatively easy and cheap to implement (Smith and Todd, 2005).

Table 1

Summary Statistics of Remittances-receiver and Non-receiver Households.

	Whole Sample			Rural Sample			Urban Sample		
Variables	Remit.	Non-Remit.	S.E. Diff.	Remit.	Non-Remit.	S.E. Diff.	Remit.	Non-Remit.	S.E. Diff.
Household Size	7.14	6.72	0.12(0.00)***	7.69	6.82	0.16(0.00)***	6.37	6.577	0.17(0.23)
Head Age	48.71	46.20	0.48(0.00)***	48.55	45.46	0.64(0.00)***	48.94	47.192	0.71(0.01)**
Head Gender (Male=1)	0.57	0.92	0.01(0.00)***	0.59	0.92	0.01(0.00)***	0.54	0.93	0.01(0.00)***
Uneducated	0.47	0.42	0.01(0.01)**	0.54	0.52	0.02(0.26)	0.36	0.29	0.02(0.00)***
Grade 1	0.14	0.15	0.01 (0.42)	0.16	0.17	0.02(0.61)	0.12	0.14	0.02(0.48)
Grade 2	0.10	0.11	0.01(0.67)	0.12	0.10	0.01(0.41)	0.09	0.12	0.02(0.11)
Grade 3	0.16	0.15	0.01(0.66)	0.13	0.12	0.02(0.81)	0.21	0.20	0.02(0.63)
Grade 4	0.12	0.16	0.01(0.00)***	0.06	0.09	0.01(0.01)**	0.22	0.26	0.02(0.07)**
Healthcare Exp.	14487.4	7639.3	531(0.00)***	14065.9	7441.3	683.2(0.00)***	15079.7	7904.8	841.2(0.00)***
Medical Exp.	4235.6	3243.5	309(0.00)***	3942.1	3070.1	397.1(0.03)**	4647.9	3475.9	489.5(0.02)**
Clinical Exp.	10251.8	4395.9	383(0.00)***	10123.7	4371.2	461.7(0.00)***	10431.7	4428.9	649.9.(0.00)***
Punjab	0.51	0.43	0.02(0.00)***	0.44	0.44	0.02(0.90)	0.60	0.43	0.03(0.00)***
KPK	0.45	0.19	0.01(0.00)***	0.53	0.20	0.02(0.00)***	0.32	0.18	0.02(0.00)***
Sindh	0.03	0.28	0.02(0.00)***	0.001	0.27	0.02(0.00)***	0.06	0.29	0.02(0.00)***
Balochistan	0.02	0.09	0.01(0.00)***	0.02	0.09	0.01(0.00)***	0.02	0.10	0.02(0.00)***
No. Observation	**861**	**14946**	**15807**	**503**	**8561**	**9064**	**358**	**6385**	**6743**

Note: The figures in parenthesis shows the corresponding probabilities of significance. ***; **; * shows significance at 1 percent; 5 percent; and 10 percent, respectively. Exp., Remit., Non-Remit. show expenditure, Remittances-receiver households, Remittances Non-Receiver households, respectively. S.E. Diff. shows standard errors differences.

estimator due to its convenience.[12] According to Dehejia and Wahba (2002), Propensity Score Matching (PSM) is more convenient (with lower bias) if the data satisfies three necessary conditions. First, the sample for both the treatment and control groups should be drawn from the same geographical location. Second, the data should be collected through the same questionnaire. Third, the data set should include a large set of variables related to the treatment and consequence variables. The data set that we use in this study satisfy all of these conditions; therefore, PSM is more suitable for our analysis.

In order to define the treatment, we first analyse the key factors that determine the receipt of remittances by consulting to multivariate analysis. This analysis comprises the binary logistic regression model:

$$Rem_i = \alpha_0 + \alpha_1 I_i + \alpha_2 HH_i + \alpha_3 Rg_i + \varepsilon_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

In Equation 1, the dependent variable Rem_i shows that whether the household i is remittances-receiver?[13] I_i is the vector which comprises the individual characteristics of household head like age, education, and sex. HH_i shows the household characteristics like size of the household. Rg_i is a vector representing all other controlled factors like regions and provinces. Rem_i is dichotomous in nature, therefore, we consult to binary Probit regression model. Onwards, in order to estimate the effect of remittances, the difference in the outcomes among the controlled and target groups is measured, that is,

$$ATT == E(Y \mid D = 1, X_i) - E(Y \mid D = 0, X_i) \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

In Equation 2, *ATT* shows Estimated Average Treatment-on-Treated effect. *Y* is the outcome which is the health care expenditure in this study. *D* is the dummy which takes a value of 1 if the household is getting remittances; otherwise, it takes the value of 0. In order to avoid this possibility of Overt Bias, we control for the observable characteristics, (X_i) in estimating the models (Lee, 2005).[14] Mosley (1997) identify that there might exist the likelihood of unseen bias between the target group and the control group. However, randomised selection in design-based studies rule out this possibility. Alternatively, randomisation eliminates the hidden bias by cancelling out the unobservable features of both the control and the target group. Propensity Score Matching (PSM) assures the similarity between the treatment and comparison groups in terms of the observed characteristics (Becker and Ichino, 2002; Dehejia and Wahba, 2002; Ravallion, 2003).[15] For instance, based on their propensity scores, the observed variables between the comparison group and the treatment group are balanced. This

[12] PSM, based on observed features, firstly measure the propensity score for both the remittances-receiver non-receiver households. Onwards, it compares the average outcome of remittances-receiver with that of the matched remittances non-receiver. The control group usually comprises those households among all the non-receiver households which are similar to remittances receiver households in other characteristics. Alternatively, the control group would have the same result as compared to what the remittances receivers would have if they had received the remittances. This assumption is known as the Conditional Independence Assumption (CIA) (Rosenbaum and Rubin, 1983).

[13] Rem_i is dichotomous in nature with which has two outcomes. 1 denotes the receiving household while 0 denotes the non-receiver.

[14] Over Bias occurs if the observable features are not identical.

[15] According to Dehejia and Wahba (2002), the matching selects those non-participants who have identical features to those of the participants. Propensity scores are actually the predicted probabilities of receiving the treatment which, in our, study is the receipts of remittances.

particular mechanism is justified by the fact that if a variable affects only the participation but not the outcome; then it is not necessary to control for the differences in this variable in the treatment group versus the control group. Likewise, if a variable does not affect the treatment but instead, only affects the outcome; then it is not necessary to control for that variable because of the fact that the consequence will not meaningfully be changed in the treatment versus control groups. Finally, the variables that neither affect the result nor the treatment are also relatively irrelevant. Thus, the characteristics that affect both the treatment and outcome are necessary for the matching process which needs to be incorporated in the model for deriving the propensity scores.[16]

3.3. Description of Variables

In this subsection, we define the variables that are used in this study. Firstly, we define the treatment and outcome variables. Onwards, we discuss the control variables.

3.3.1. *Treatment and Outcome Variables*

The receipt of remittances is a treatment variable in this study. In PSLM, there are detailed questions with regard to domestic as well as foreign remittances received by the households. In this study, we focus only on foreign remittances in order to see its impact on healthcare expenditure. The outcome variable in this study is households' healthcare expenditure in Pakistan which comprises medical expenditure and clinical expenditure. In PSLM, medical expenditures are regarded as annual purchase of medicines and vitamins, medical apparatus, supplies or equipment and other health related expenditures. Likewise, clinical expenditures include the annual fees paid to specialists, hakeems/midwives and doctors outside the hospital. Additionally, it also incorporates hospital charges and expenses on laboratory tests etc. By combining the medical and clinical expenditures, we get the total health expenses of the households.

3.3.2. *Control Variables*

There are three sets of explanatory variables. First, we include the individual level characteristics of the households' head like household heads' gender, age, education and, age square. Second, as household characteristic, we use household size. Finally, we incorporate regional characteristics in terms of dummies for the provinces. Gender, in this study, has been incorporated to control for the gender of the household head. Education is the most important variable among the indicators of human capital as far as the effect of remittances on healthcare expenditures is concerned. It is a general perception that educated individuals are likely to spend more fractions of remittances on healthcare expenditures compared to the non-educated individuals. In PSLM, the education of respondent has been asked as the highest class achieved. We categorised them into five main groupings, i.e. illiterate, primary, middle, secondary and tertiary. We also use household size in list of control variables. It is expected that larger households will spend less proportion of remittances on healthcare expenditures as compared to smaller households. In this study, we carry out separate analysis for rural and urban regions, so that to observe any regional differences in healthcare expenditures of remittance-

[16] See Caliendo and Kopeinig (2008) for the details of practical guidelines.

receiving and non-receiving households. This variable is characterised as rural and urban areas whereas urban serves as the corresponding reference group.

4. EMPIRICAL RESULTS

This section presents the empirical results. First, we discuss the results for the overall sample. Onwards, we discuss the results for the urban and rural areas, respectively.

4.1. Impact of Remittances on Healthcare Expenditure in Whole Sample

We estimate the propensity score of remittances receipt through Probit regression. As is stated earlier, the receipt of remittances is the treatment which takes the value of 1 if foreign remittances are received by the household; otherwise, it takes a value of 0. In this specification, we include household head's age, gender and education level as individual level characteristics. Likewise, on household level, it incorporates household size. Besides, dummy variables for region and provinces are taken in order to measure the regional and provincial variation in remittances. Before conducting the PSM, we need two conditions that need to be met in order to calculate the *Average Treatment on the Treated* (ATT) effect on the basis of the propensity scores of households (Rosenbaum and Rubin, 1983). First, given the propensity scores, we need to balance the pre-treatment characteristics for the control and treatment groups.[17] Second, we need the condition of un-confoundedness which states that given a set of observable correlates '*X*' that are not affected by treatment; the potential outcomes '*Y*' are independent of treatment assignment '*T*'. After finding propensity scores through Probit regression, we use Radius Matching and Kernel Matching in order to measure the *Average Treatment on the Treated* (ATT).[18]

Table 2 shows the results on the determinants of remittances. We incorporate only those variables in the estimation for which the conditions of balancing and un-confoundedness are satisfied. As we can see, the probability of remittances increases with the age of household head and household size. Higher household size enhances the probability of members of the households to be migrants. Likewise, remittances are higher in those households which are headed by females. Region does not play any significant role in the receipt of remittances. Education of all categories enhances the probability of remittances which is a standard result in the literature on the returns to education. The cross-province comparison shows that remittances are higher in Punjab and Khyber-Pakhtunkhwa (KPK) as compared to Balochistan while remittances in Sindh are comparatively lower. This finding is justified by the fact that we have higher migrant networks in Punjab and Khyber-Pakhtunkhwa (KPK).

[17]See Figure A1, Tables A2 and A3 in appendix A for details.

[18]PSM approach tries to capture the effects of different observed covariates *X* on participation in a single propensity score or index. Then, outcomes of participating and nonparticipating households with similar propensity scores are compared to obtain the program effect. Households for which no match is found are dropped because no basis exists for comparison. Radius Matching and Kernel Matching are the two different methods of PSM. These are the matching algorithms (scales) that are used to match beneficiaries with non-beneficiaries. These scales identify the comparison group by checking for balance in the characteristics of the treatment and comparison groups; and estimating the program effect. In the radius matching, a maximum propensity score radius is established, and all non-beneficiaries within the given radius of a beneficiary are matched to that beneficiary. Whereas, in case of the Kernel matching for each treated subject, a weighted average of the outcome of all non-beneficiaries is derived. The weights are based on the distance of the non-beneficiaries' propensity scores to that of the treated subjects, with the highest weight given to those with scores closest to the treated unit.

Table 2

Probit Model for Propensity Scores to find the Effect of Remittances (Whole Sample)

Variable	Coefficient	St. Error
Region (Urban=1)	0.020	0.801
Head Age	0.017***	0.003
Head Gender (Male=1)	–2.352***	0.089
Household size	0.091***	0.000
Education of the Head (Illiterate as Reference)		
Grade 1-5	0.388***	0.116
Grade 6-8	0.464***	0.132
Grade 9-10	0.626***	0.116
Grade 11 and above	0.468***	0.127
Province (Baluchistan as Reference)		
Punjab	1.459***	0.256
Sindh	–0.686**	0.318
Khyber Pakhtunkhwa	2.036***	0.255
Constant	–4.058***	0.297
LR^2 χ^2	1274.58	
Prob> χ	0.000	
Observation	15807	

Note: *; **; *** Shows significance at 10 percent; 5 percent; 1 percent, respectively. Among 15807 households, 859 households get the remittances and 14837 households don't get remittances.

Given the results in Table 2, the results on Average Treatment on Treated (ATT) effect are shown in Table 3. We can see that the ATT effect on the total healthcare expenditure is significantly positive. For instance, the coefficient from the Radius method is 0.499 which means that receivers of remittances spend 49.9 percent more on overall health care expenditure compared to the non-receivers. Likewise, in case of Kernel method, the result shows that receivers of remittances spend 43.7 percent more on overall healthcare expenditures compared to the non-receivers. The estimated effect is almost similar across both of the matching methods. Furthermore, the treatment units and the number of controls are similar in both cases, which implies that the sample size in both the cases remain the same. Given the disaggregation, the ATT effect of remittances on medicine expenditure shows that remittances receivers spend 24.6 and 22 percent more on medicines compared to the non-receivers in Radius and Kernel methods, respectively. Likewise, in case of clinical expenditure, the ATT effect of remittances shows that remittances receivers spend 61 and 49.9 percent more as compared to non-receivers in Radius and Kernel matching, respectively. Over all, the impact on clinical expenditure is higher than that of the medicine expenditure. This finding shows the income effect which implies that, at lower levels of incomes, households refer to informal health care providers or quack doctors.[19] Alternatively, with the receipts of remittances, households shift from informal healthcare providers to the clinical services for their health care.

[19] There are significant fraction of Informal healthcare providers (IPs) in the health system of developing nations (Sudhinaraset, et al. 2013).

Table 3

ATT Effect of Remittances on Healthcare, Medicine and Clinical Expenditures (Whole Sample)

	Healthcare Expenditure		Medicine Expenditure		Clinical Expenditure	
	Radius Method	Kernel Method	Radius Method	Kernel Method	Radius Method	Kernel Method
ATT	0.499***	0.437***	0.246***	0.220***	0.610***	0.499***
No. Treated	859	859	599	599	840	840
No. Control	14837	14837	11827	11827	14166	14166
T-value	14.80	12.21	14.80	4.21	14.51	11.15

Note: *; **; *** shows significance at 10 percent; 5 percent; 1 percent, respectively. Bootstrapped standard errors with 10,000 repetitions.

4.2. Impact of Remittances on Healthcare Expenditure in Urban Areas

In order to measure the propensity score of remittances receipt in urban areas, we include age, age-squared, education level and gender of the household head as individual level characteristics. Likewise, on household level, it incorporates household size. In order to compare provincial level variations in the receipt of remittances, we also incorporate provincial dummies. The conditions of balancing and un-confoundedness are met to measure the *Average Treatment on the Treated* (ATT) effect based on the propensity score of households.[20] After calculating propensity scores through Probit regression model, the *Average Treatment on the Treated* (ATT) effect is calculated while using the Kernel Matching and Radius Matching. Table 4 shows the results on the determinants of remittances in this case. Again, we include only those variables for the properties of balancing and un-confoundedness are satisfied. Remittances in urban areas are higher for those households which are headed by females. Likewise, households whose heads' education level is high school or above receive higher remittances in the urban areas. The results also show that remittances are increasing household size. Even, in the urban areas, Punjab and Khyber-Pakhtunkhwa (KPK) is performing better in terms of remittances receipt as compared to Balochistan while Sindh has lower incidence of remittances receipts.

In order to estimate the effect of remittances on healthcare expenditure in case of urban areas, we estimate the ATT which are shown in Table 5. In case of total healthcare expenditure, the coefficient of ATT through Radius matching is 0.407 which indicates that receivers of the remittances are spending 40.7 percent more as compared to the non-receivers in the urban areas of Pakistan. Likewise, Kernel matching shows that remittances-receivers are spending 43.5 percent more as compared to non-receivers. The estimated effect is almost similar across both the matching methods. Furthermore, the treatment units and the number of controls are similar in both cases which implies that the sample size in both cases remains the same. In case of medicine expenditures, remittances-receivers spend 23 and 32.5 percent more in urban areas as compared to non-receivers in Radius and Kernel matching, respectively. Likewise, remittances-receivers spend 50.1 and 44.3 percent more on clinical expenditure in Radius and Kernel matching, respectively. Thus, in urban areas, the impact of remittances is higher on clinical expenditure as compared to medicine expenditure.

[20] See Figure B1, Tables B2 and B3 in Appendix B for details.

Table 4

Probit Model for Calculating the Propensity Scores to find the Effect of Remittances (Urban Households)

Variable	Coefficient	St. Error
Head Gender (Male=1)	–2.510***	0.018
Head Age	0.010**	0.005
Household Size	0.051***	0.018
Education of Head (Illiterate as Reference)		
Grade 1-5	0.174	0.197
Grade 6-8	0.089	0.219
Grade 9-10	0.508***	0.170
Grade 11 and above	0.360**	0.166
Province (Balochistan as Reference)		
Punjab	1.376***	0.372
Sindh	-0.413	0.426
Khyber Pakhtunkhwa	1.668***	0.376
Constant	–3.057***	0.202
LR^2 χ^2	527.37	
Prob> χ	0.000	
Observation	6743	

*Note: **; ***; **** Shows significance at 10 percent; 5 percent; 1 percent, respectively. Among 6743 households, 358 households are getting remittances while the remaining 6385 households are not getting remittances.

Table 5

ATT Effect of Remittances on Health Care, Medicine and Clinical Expenditure (Urban Areas)

	Healthcare Expenditure		Medicine Expenditure		Clinical Expenditure	
	Radius Method	Kernel Method	Radius Method	Kernel Method	Radius Method	Kernel Method
ATT	0.407***	0.435***	0.230***	0.325***	0.501***	0.443***
No. Treated	357	357	258	258	349	349
No. Control	6312	6312	5160	5160	6040	6040
T-value	7.47	7.46	3.04	4.03	7.66	6.28

*Note: **; ***; **** shows significance at 10 percent; 5 percent; 1 percent, respectively. Bootstrapped standard errors with 10,000 repetitions.

4.3. Impact of Remittances on Healthcare Expenditure in Rural Areas

This section reports results for the rural areas of the country. Again, in the first step, we estimate the propensity score of remittances receipt which include age, age-squared, gender, and education levels of the household head as individual level characteristics. On household level, we incorporate household size. To capture provincial variations in the receipt of remittances, we control for provincial dummies. Again, even, in this case, the conditions of balancing and un-confoundedness are met.[21] The ATT effects are estimated for those households having the same observable characteristics

[21] See Figure C1 and Tables C2 and C3 in Appendix C for details.

while using Radius and Kernel matching. Table 6 shows the results of the corresponding Probit regression. The results show that remittances are higher in those households which are headed by females. The coefficient on household size is positive and significant, depicting that the probability of remittances receipts increases with the increase in household size. The likelihood to receive remittances increases in the age of the household head. The estimate of household head education is positive and significant for almost all education levels except grade 11 and above.

Table 6

Probit Model for Calculating the Propensity Scores to Find the Effect of Remittances (Rural Households)

Variable	Coefficient	St. Error
Household Size	0.108***	0.013
Head Age	0.020***	0.004
Head Gender (Male=1)	–2.203***	0.121
Education of Head (Illiterate as Reference)		
Grade 1-5	0.481***	0.144
Grade 6-8	0.645***	0.166
Grade 9-10	0.642***	0.160
Grade 11 and above	0.410	0.216
Province (Balochistan as Reference)		
Punjab	1.494***	0.353
Sindh	–1.498***	0.564
Khyber Pakhtunkhwa	2.263***	0.350
Constant	–4.560***	0.399
LR^2 χ^2	792.59	
Prob> χ	0.000	
Observation	9064	

Note: *; **; *** Shows significance at 10 percent; 5 percent; 1 percent, respectively. Among 9064 households, 503 households are getting the remittances while 8561 households are not getting remittances.

In order to see the impact of remittances on healthcare expenditure, we estimated the corresponding ATT effects which are shown in Table 7. The results show that the ATT effect on total healthcare expenditure is positive in rural areas of the country. The coefficient of ATT through Radius method is 0.565 which shows that remittances-receiver households spend 56.5 percent more on total healthcare expenditure as compared to non-receiver households. Likewise, Kernel matching shows that remittances-receiver households spend 39.5 percent more on total health care expenditure as compared to non-receiver households. The number of controls and treatment units are also same in both cases. In the case of medicine expenditure, the ATT from Radius matching shows that remittances-receivers spend 25.9 percent more on medicine expenditures compared to the non-receivers. The estimates of ATT effect from Kernel method shows that remittances-receivers spend 10.2 percent more on medicine expenditures compared to the non-receivers. Similar is the case with clinical expenditure where remittances-receivers spend 68.6 and 51.1 percent more than non-receivers in Radius and Kernel matching, respectively. The cross-region comparison reveals that remittances receiver households in rural areas spend more on clinical expenditure as compared to remittances-receiver households in the urban areas.

Table 7

ATT Effect of Remittances on Health Care, Medicine and Clinical Expenditure in Rural Areas

	Health Care Expenditure		Medicine Expenditure		Clinical Expenditure	
	Radius Method	Kernel Method	Radius Method	Kernel Method	Radius Method	Kernel Method
ATT	0.565***	0.395***	0.259***	0.102***	0.687***	0.511***
No. Treated	502	502	341	341	491	491
No. Control	8525	8525	6667	6667	8126	8126
T-value	13.26	8.71	3.96	4.40	12.57	8.76

Note: *; **; *** Shows significance at 10 percent; 5 percent; 1 percent, respectively. Bootstrapped standard errors with 10,000 repetitions.

5. CONCLUSION

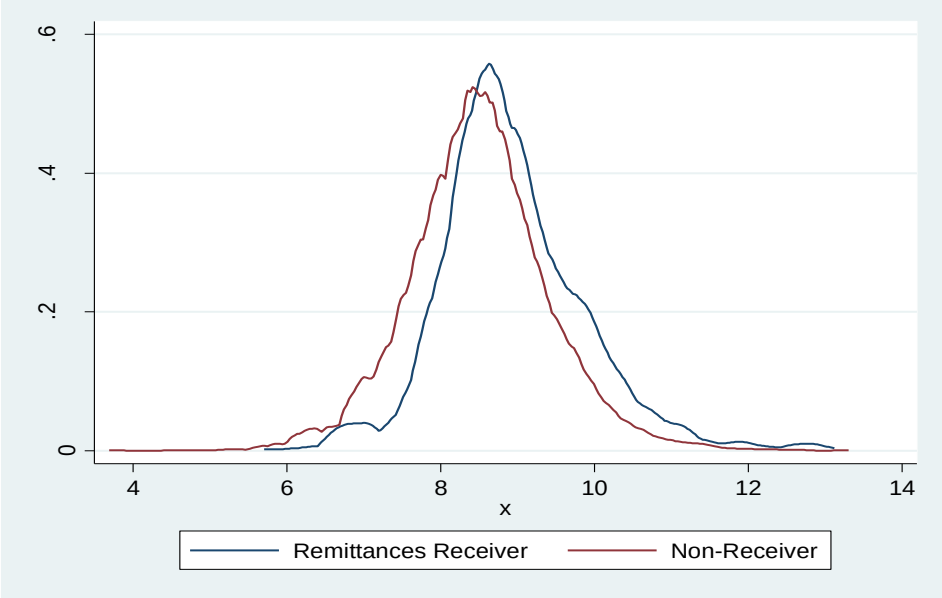
This study is motivated by recent surge in research on the effect of migration or remittances in developing countries. The inflow of remittances relaxes the credit constraints of households which, in turn, enhances spending on health care. In this study, specifically, we analyse the impact of remittance on household healthcare expenditure in Pakistan by using PSLM (2011-12). PSLM (2011-12) is one of the largest national representative survey which covers most of the socio-economic characteristics of households. This, in other words, implies that we cover a larger sample as compared to the existing studies. We classify total healthcare expenditure into medical expenditure and clinical expenditure. Firstly, we do the analysis for the whole sample for all the three categories, i.e. total healthcare expenditure, medical expenditure, and clinical expenditure. Onwards, we decompose our sample into urban and rural areas and do separate analysis for both the regions. In order to control for the problems of endogeneity and sample selection bias, we use the Propensity Scores Matching (PSM) instead of traditional econometric techniques.

We find that health expenditure, including both medical expenditure and clinical expenditure, are higher for the remittances-receivers as compared to the non-receivers. This positive relationship is statistically robust across the urban and rural areas of Pakistan. Moreover, for remittances-receiver households, the clinical expenditures are higher as compared to the medical expenditures. It is an indication of the fact that clinical services like clinical consultancies including fees of the doctors and specialists, laboratory tests, hospital charges etc. are expensive in Pakistan. Thus, remittances help in covering the expenditures on such services which illustrates improvement in the health status due to the precautionary nature of the health outcomes. In order to have better health outcomes in the country, our analysis suggests two guidelines. First, certainly, the government should encourage and, properly, channelise the inflow of remittances. Second, clinical services should be adequately regulated both for quality and user fees. However, certainly, more studies are needed to exactly identify the channels through which the effects of remittances translate into health outcomes. This would help us in providing clear policy guidelines in this regard.

APPENDIX A

Overlapping and Balancing Assumptions for Whole Sample

Fig. A1. Propensity Scores for Remittance Receiver and Non-receiver in Whole Sample



Note: Figure A1 shows the overlap between the distributions of the propensity scores of remittances receivers and non-receivers. PSM includes only those observations which lies in the overlapping areas while the remaining are dropped.

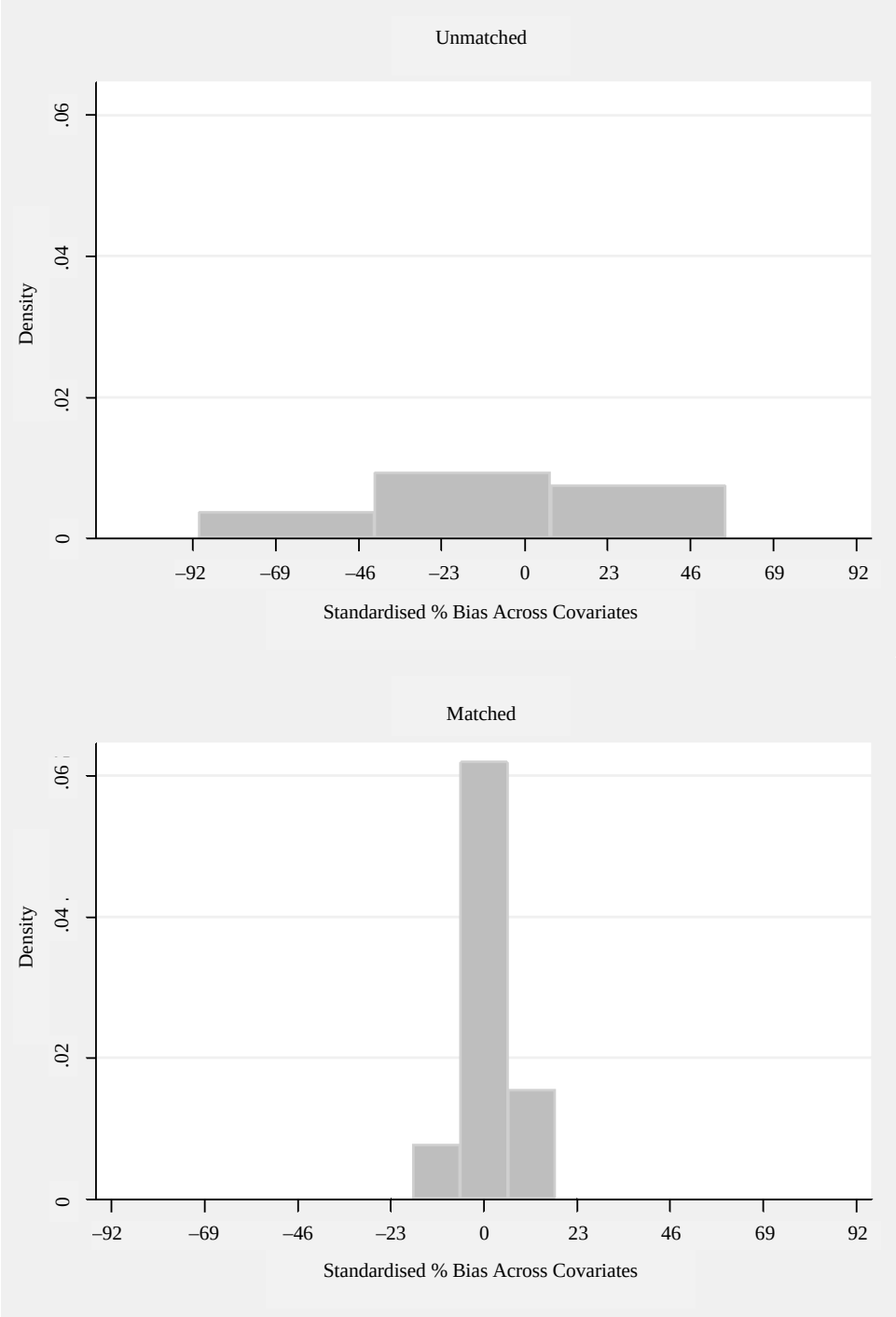
Table A1

Covariates between Treated and Non-treated Units of Remittances Receiver and Non-receiver (Whole Sample)

Variable	Mean Treated	Mean Untreated	St. Difference
Region(Urban=1)	0.51	0.43	0.175
Household Size	6.44	6.74	–0.080
Head Age	47.86	46.37	0.104
Head Gender	0.88	0.90	–0.073
Education of Head (Illiterate as Reference)			
Grade 1-5	0.12	0.16	–0.096
Grade 6-8	0.09	0.11	–0.046
Grade 9-10	0.15	0.15	–0.017
Grade 11 and above	0.16	0.16	–0.008
Punjab	0.47	0.44	0.068
Sindh	0.23	0.27	–0.100
Khyber Pakhtunkhwa	0.23	0.21	–0.282

Note: The second important assumption of PSM is to check the balance of covariates between treated and non-treated households. If covariates are not balanced between treated and non-treated households, the result will be upward or downward biased. In table A1, we can see that almost all of the covariates show balancing.

Fig. A2. Standardised Percentage Bias across Covariates in Whole Sample



Note: Figure A2 show the percentage reduction in bias after balancing the covariates between treated and non-treated households. Standardised percent bias is shrinking to about zero.

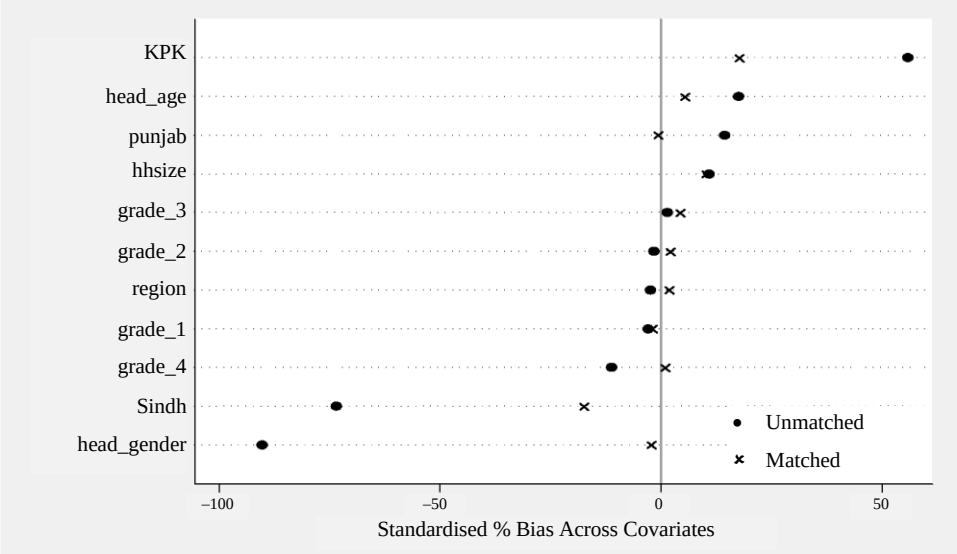
Table A2

Biasness between Unmatched and Matched Variables (Whole Sample)

Variable	Unmatched/Matched U/M	Mean		%Bias	Reduce Bias
		Treated	Control		
Head Gender (Male=1)	U	0.567	0.925	–90.2	97.2
	M	0.567	0.576	–2.2	
Household Size	U	7.137	6.719	11.0	7.3
	M	7.137	6.749	10.2	
Region(Urban=1)	U	0.416	0.427	–2.3	18.9
	M	0.416	0.407	1.9	
Head Age	U	48.714	46.198	17.6	69.1
	M	48.714	47.938	5.4	
Education of Head (Illiterate as Reference)					
Grade 1-5	U	0.144	0.154	–2.9	30.0
	M	0.144	0.151	–2.0	
Grade 6-8	U	0.105	0.109	–1.6	-35.8
	M	0.105	0.098	2.1	
Grade 9-10	U	0.159	0.154	1.5	-190.4
	M	0.159	0.143	4.4	
Grade 11 and above	U	0.124	0.163	–11.1	91.8
	M	0.124	0.121	0.9	
Province (Balochistan as Reference)					
Punjab	U	0.505	0.433	14.5	95.2
	M	0.505	0.509	–0.7	
Sindh	U	0.030	0.279	-73.3	76.1
	M	0.030	0.090	-17.5	
Khyber Pakhtunkhwa	U	0.445	0.194	56.0	68.3
	M	0.445	0.365	17.8	

Note: Table A2 shows the biasedness between mean of tread and non-treated households before and after the matching. The percentage reduction in bias between treated and no-treated households after matching is shown in the last column.

Fig. A3. Standardise Difference between Matched and Unmatched Variables in Whole Sample

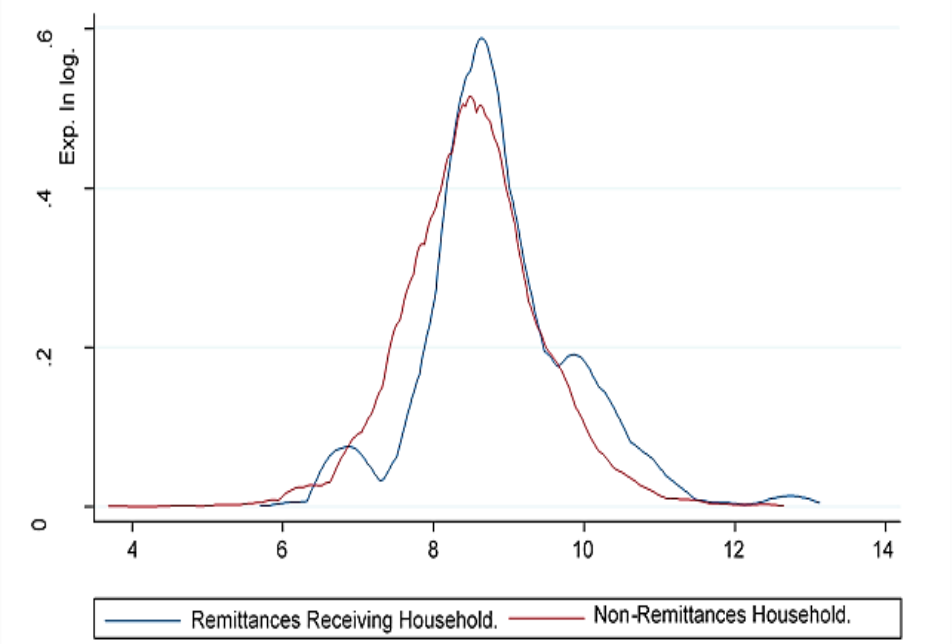


Note: Black dot represent the unmatched pair and cross dot represent matching pair. After using balancing technique of matching the bias is reduced.

APPENDIX B

Overlapping and Balancing Assumptions for Urban Areas

Fig. B1. Propensity of Scores for Remittance Receiver and Non-receiver in Urban Areas



Note: Figure B1 displays that the overlap assumption is satisfied between non-treated and treated.

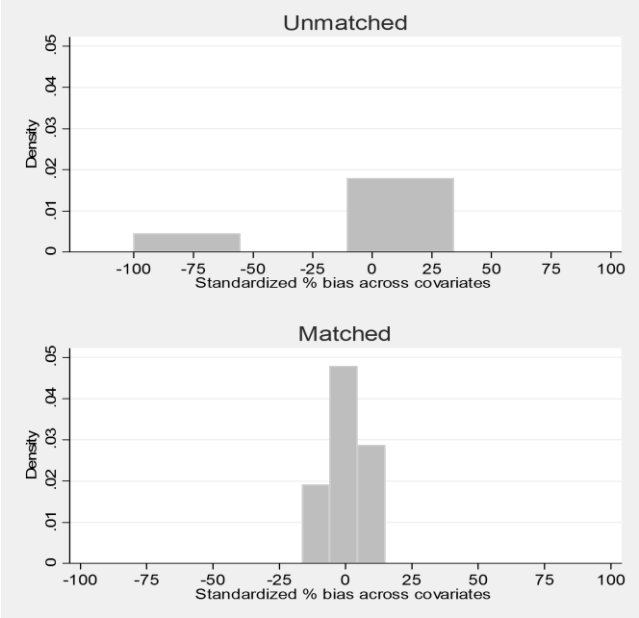
Table B1

Covariates between Treated and Non-treated Units of Remittances Receiver and Non-receiver (Urban Areas)

Variable	Mean Treated	Mean Untreated	St. Difference
Head Gender (Male=1)	0.89	0.91	–0.044
Household Size	6.15	6.57	–0.119
Head Age	50.33	47.34	0.216
Education of Head (Illiterate as Reference)			
Grade 1-5	0.13	0.14	–0.015
Grade 6-8	0.09	0.12	–0.097
Grade 9-10	0.18	0.20	–0.040
Grade 11 and above	0.22	0.26	–0.095
Punjab	0.50	0.44	0.122
Sindh	0.25	0.28	–0.092
Khyber Pakhtunkhwa	0.19	0.19	0.007

Note: In Table B1, we compare the variables between treated and non-treated households. The results show that head's gender of mean treated and untreated is almost the same. The variable household size's mean of untreated is greater than that of treated. Education of the head is in negative standardise difference in all grades and the provinces difference is same and positive.

Fig. B2. Standardised Percentage Bias across Covariates in Urban Areas



Note: Figure B2 clearly shows that bias in unmatched is greater as compared to bias in matched.

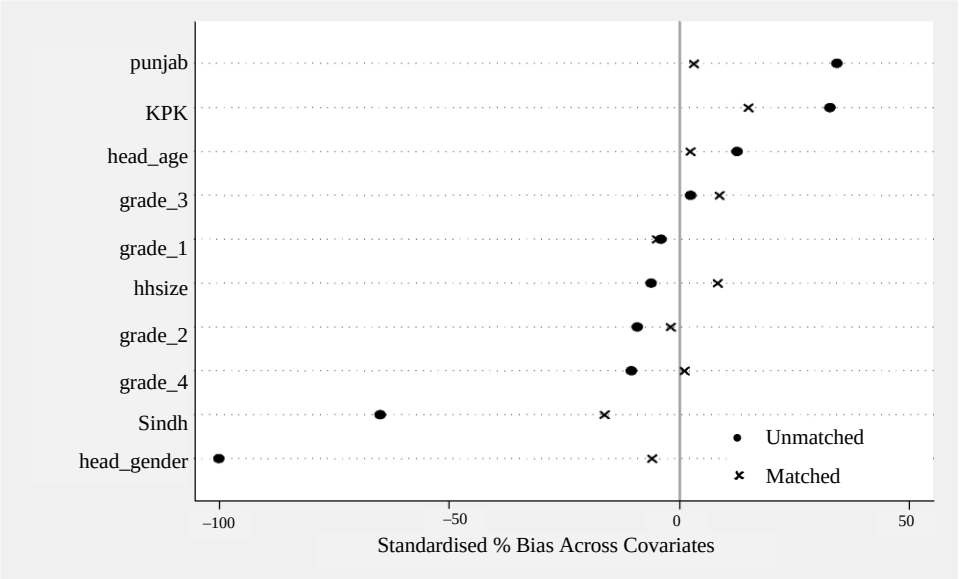
Table B2

Biasness between Unmatched and Matched Variables (Urban Sample)

Variable	Unmatched/Matched U/M	Mean		%Bias	Reduce Bias
		Treated	Control		
Head Gender (Male=1)	U	0.539	0.936	–100	94.2
	M	0.539	0.563	–6.0	
Household Size	U	6.366	6.577	–6.0	-38.2
	M	6.366	6.074	8.3	
Head Age	U	48.941	47.193	12.7	81.8
	M	48.941	48.623	2.3	
Education of Head (Illiterate as References)					
Grade 1-5	U	0.123	0.136	–3.9	-25.4
	M	0.123	0.139	–4.9	
Grade 6-8	U	0.089	0.117	–9.0	78.7
	M	0.089	0.095	–1.9	
Grade 9-10	U	0.207	0.196	2.6	-235.7
	M	0.207	0.172	8.6	
Grade 11 and above	U	0.218	0.262	–10.3	88.8
	M	0.218	0.213	1.1	
Province (Balochistan as Reference)					
Punjab	U	0.598	0.428	34.4	90.9
	M	0.598	0.582	3.1	
Sindh	U	0.059	0.294	–64.9	74.9
	M	0.059	0.118	–16.3	
Khyber Pakhtunkhwa	U	0.321	0.180	32.9	54.3
	M	0.321	0.257	15	

Note: Table B2 show the biasedness between mean of tread and non-treated households before and after the matching in urban areas. The percentage reduction in bias between treated and no-treated households after matching is shown in the last column.

Fig. B3. Standardise Difference between Unmatched and Matched Variables (Urban Areas)

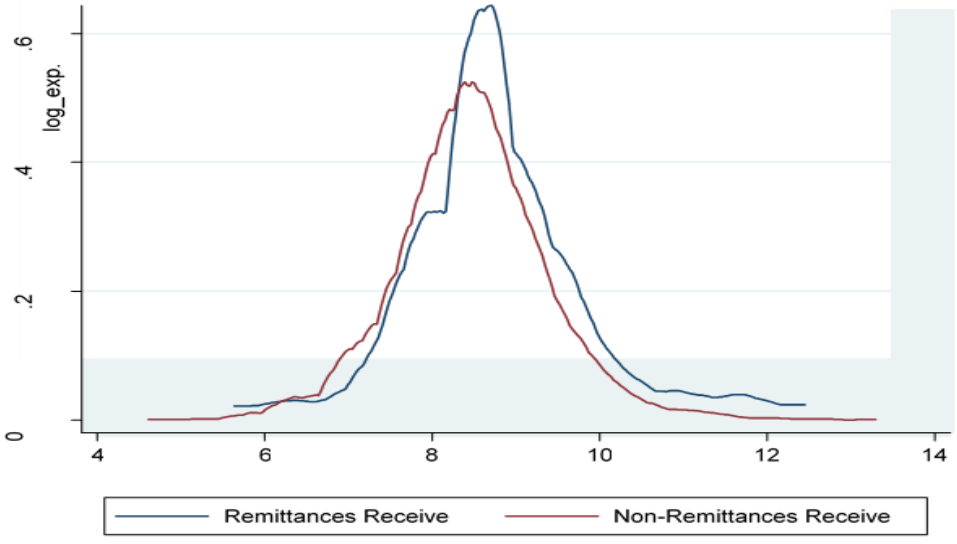


Note: Black dot represent the unmatched pair and cross dot represent matching pair. After using balancing technique of matching the bias is reduced.

APPENDIX C

Overlapping and Balancing Assumptions for Rural Areas

Fig. C1. Propensity of Scores for Remittance Receiver and Non-Receiver in Rural Areas



Note: Figure C1 displays that the overlap assumption is satisfied between non-treated and treated.

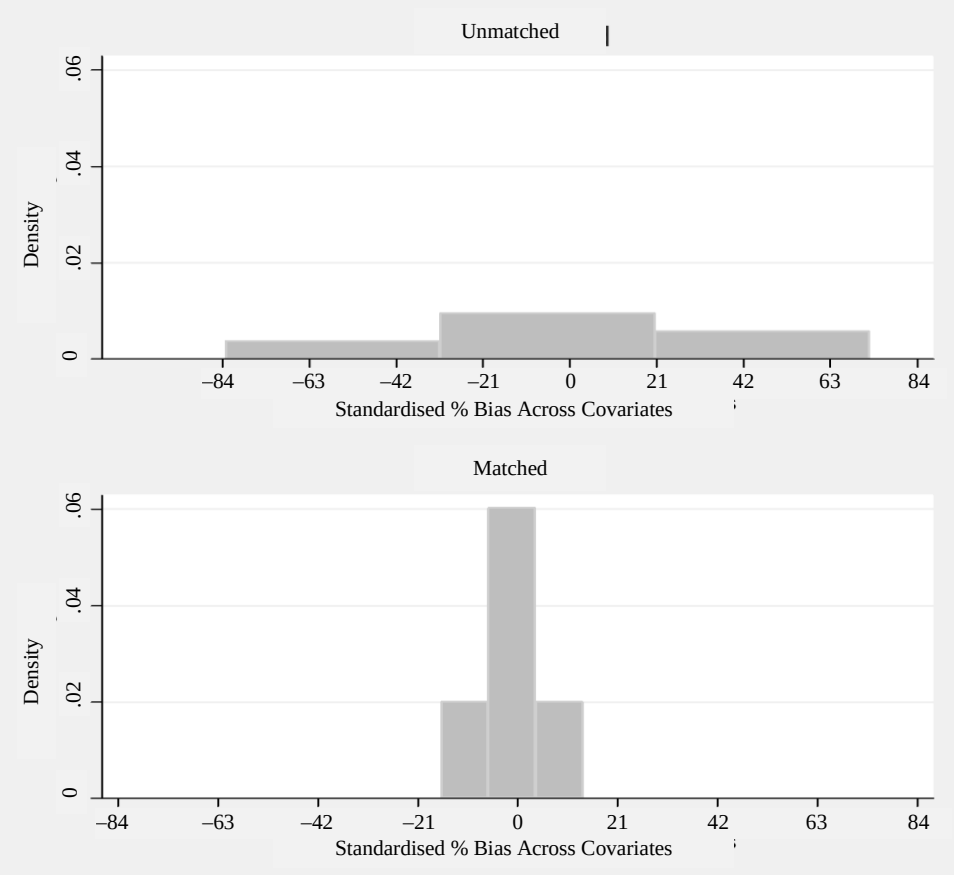
Table C1

Covariates between Treated and Non-treated Units of Remittances Receiver and Non-receiver (Rural Sample)

Variable	Mean Treated	Mean Untreated	St. Difference
Head Gender (Male=1)	0.86	0.90	0.088
Household Size	7.22	6.88	0.033
Head age	46.14	45.65	0.033
Education of Head (Illiterate as Reference)			
Grade 1-5	0.12	0.17	-0.125
Grade 6-8	0.10	0.10	-0.009
Grade 9-10	0.11	0.12	-0.029
Grade 11 and above	0.11	0.09	0.099
Province (Balochistan as Reference)			
Punjab	0.45	0.44	0.024
Sindh	0.22	0.25	-0.108
Khyber Pakhtunkhwa	0.27	0.22	0.108

Note: In Table C1, the balance of covariates between treated and non-treated units in rural areas have been shown.

Fig. C2. Standardised Percentage Bias across Covariates in Rural Sample



Note: Figure C2 clearly shows that bias in unmatched is greater as compared to bias in matched.

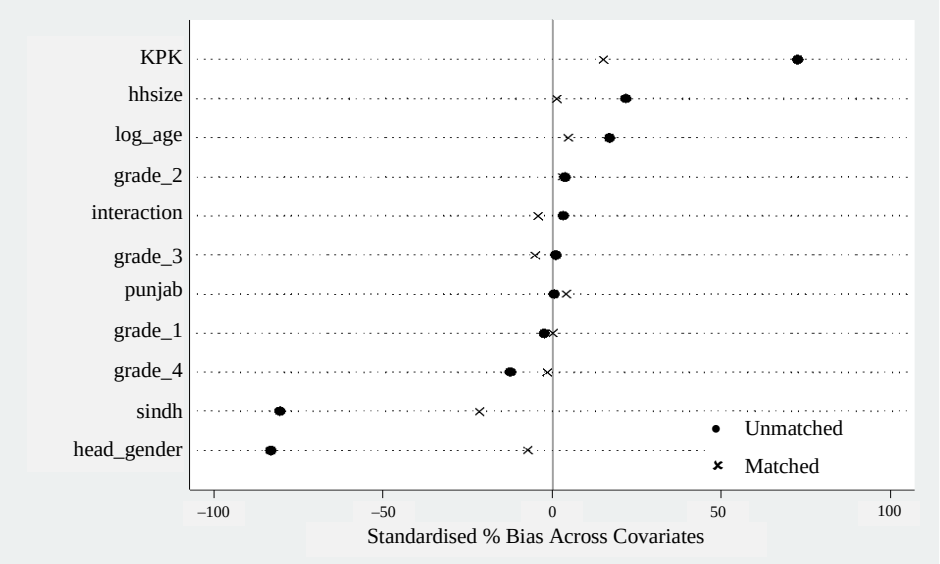
Table C2

Biasness between Unmatched and Matched Variables (Rural Sample)

Variable	Unmatched/Matched U/M	Mean Treated	Mean Control	%Bias	Reduce Bias
Head Gender (Male=1)	U	0.586	0.918	–83.3	91.9
	M	0.586	0.614	–6.8	
Household Size	U	7.686	6.824	21.7	77.7
	M	7.686	7.493	4.9	
Head age	U	48.553	45.457	21.2	82.7
	M	48.553	48.018	3.7	
Education of Head (Illiterate as Reference)					
Grade 1-5	U	0.159	0.168	–2.3	29.2
	M	0.159	0.165	–1.7	
Grade 6-8	U	0.115	0.104	3.7	34.7
	M	0.115	0.108	2.4	
Grade 9-10	U	0.125	0.122	1.1	-94.6
	M	0.125	0.118	2.1	
Grade 11 and above	U	0.058	0.090	–12.4	88.1
	M	0.058	0.061	–1.5	
Province (Balochistan as Reference)					
Punjab	U	0.439	0.436	0.6	33.4
	M	0.439	0.437	0.4	
Sindh	U	0.010	0.268	–80.4	80.0
	M	0.010	0.615	–16.1	
Khyber Pakhtunkhwa	U	0.533	0.203	72.6	81.0
	M	0.533	0.470	13.8	

Note: Table C2 shows the biasness between mean of treated and non-treated households before and after the matching in rural areas. The percentage reduction in bias between treated and no-treated households after matching is shown in the last column.

Fig. C3. Standardise Difference between Matched and Unmatched Variables in Rural Sample



Note: Figure C3, shows the difference between before and after matching for all variables used.

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