



**RURAL-URBAN MIGRATION AND THE WELLBEING OF THE
MIGRANT-SENDING HOUSEHOLDS: AN IMPACT EVALUATION STUDY**

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Abstract

Rural-urban migration is largely depicted as a household survival strategy, yet no studies have been conducted in South Africa, that aim to uncover its impact on the sending households. This novel study attempts to quantify the impacts of rural-urban migration on the economic and subjective wellbeing of the sending households, using the National Income Dynamics Survey data. It does so by utilising five methodologies with increasing consistency and precision, namely: Ordinary Least Squares, Fixed/Random Effects, Difference in Differences, Difference in Differences with Propensity Score Matching and Difference in Differences with Instrumental Variables, controlling for pertinent issues such as fixed effects, self-selection and endogeneity. Our econometric analysis reveals a positive correlation between migration and the subjective wellbeing of the sending household. This effect can be attributed to a range of factors discussed in the study, one of which is the positive association observed between the migration of a household member and the origin household's economic wellbeing. This upswing in economic wellbeing is captured through an increase in the sending household's monthly income per capita and increased remittance inflows, due to the rural-urban migration of a household member. From our analysis, we can infer that the improvement in economic wellbeing offsets the psychological effects of separation, thus leading to enhanced subjective wellbeing. In addition to increased remittance inflows, the descriptive statistics revealed another channel through which the sending household's income per capita can be positively affected. The majority of individuals engaging in rural-urban migration are unemployed and inactive in the labour market, prior to migration, thus their departure would leave the sending household economically better off, as there would be fewer individuals to support with the household's monetary resources.

Introduction

Rural-urban migration has formed part of South African households' survival strategies since the onset of democracy (Lehohla, 2006). During apartheid, the Bantu Authorities Act and the Group Areas Act dictated the mobility of the majority of South Africans (Bouare, 2001). This had implications for the nature and pattern of migration during those times. Due to these movement restrictions, a large number of South Africans were only able to participate in temporary labour migration (Posel, 2004).

The removal of these movement restrictions inspired an interesting observation in migration patterns. Instead of becoming more permanent; rural-urban migration has remained circulatory

due to a large number of migrants preferring to retain ties with their households of origin (Posel, 2004). Furthermore, the demographics of the migrant also experienced a shift as more women were seen to be rapidly joining the migration pool.

The nature and patterns of rural-urban migration in South Africa is an issue that is relatively well-researched. However, the consequences of this rapidly increasing migration are yet to receive sufficient attention in South African literature. This is crucial to formulate policies that are relevant to the population's present circumstances. Longitudinal datasets that track individuals over time have only been recently made available in South Africa. And, as such, in-depth analyses on the effects of rural-urban migration in South Africa are fairly new and steadily increasing.

Nevertheless, there is still much to be done to fully uncover the implications of internal migration for the South African population. The decision to migrate is usually seen as a household survival strategy and thus, focusing on the migrant alone does not provide a complete picture of the consequences of rural-urban migration. There is a vital need to understand how the out-migration of a household member affects their origin household. Does it yield the desired effect and improve the outcomes of those that are left behind?

As much as the sending households' perspective has not been captured in South African literature, the same does not hold true for the international literature on rural-urban migration. In different parts of the world, there has been consistent evidence that rural-urban migration has a significant effect on the sending households (Nguyen, Yeoh and Toyota, 2006), (Lu, 2012). There is no consensus in literature as to the direction of this effect. This study improves upon these research outputs through its innovative econometric techniques that control for reverse causality and fixed effects.

The Council of Social Work and Education defines economic well-being as having present and future financial security. This includes the ability of individuals, families and communities to consistently meet their basic needs and be in control of their daily finances. It also includes the ability to make economic choices and feel a sense of security, satisfaction, and personal fulfillment with one's personal finances and employment pursuits. According to Stone and Mackie (2013), subjective wellbeing refers to how people experience and evaluate their lives and specific domains and activities in their lives.

There is quite vast literature on remittances and how they possibly affect the sending communities. Nevertheless, most studies that exist which focus on the issue of remittances

such as (Ajaero et al., 2013), (Adepoju et al., 2018), (Nguyen et al., 2015) (Rempel & Lobdell, 1978), are concerned with the impact of remittances on rural inequality and development and do not explore the impact of migration on the remittances themselves. Moreover, there is an abundance of studies investigating the effect of remittances in the context of international migration as opposed to internal rural-urban migration, such as (Russell, 1992) and (Giuliano and Ruiz-Arranz, 2009). The effect of rural-urban migration on the remittances received by the sending household is yet to be fully explored. This paper aims to fill that gap by not only investigating the impact of rural-urban migration on remittances, but by doing so at a household level. Furthermore, it goes on to investigate the impact of the rural-urban migration of a household member on the household monthly income per capita of the sending households.

The economic wellbeing perspective, however, in isolation, overlooks the psychosocial costs of rural-urban migration as migration often involves family disruption, reconstruction of household roles and prolonged separation (Lu, 2012). Studies such as (Ivlevs et al., 2019) aim to investigate the effect of migration on the subjective wellbeing of the left-behind. However, the econometric methodology employed does not take into account issues of endogeneity, or utilise a robust quasi-experimental design like this study does.

On top of improving on the current international migration literature, the focus on migrant-sending households makes our study a significant contributor to the current migration research in South Africa, as this is something that has scarcely been done in the country. This is a very crucial perspective in the current economic climate where rural-urban migration forms a vital part of many South Africans' lives. Understanding the impacts of migration from both sides puts us in a position where we are not only able to formulate policies that correctly address rural-urban migrants' circumstances but we will also be able to develop holistic and fitting support structures in communities where there are high rates of rural-urban migration.

The current policies governing urbanization in South Africa tend to be reactive rather than proactive. An example would be housing policies in South Africa: Instead of demolishing informal settlements, which usually act as a gateway for migrants, the government could invest in a more effective housing policy that allows them to plan ahead by providing cleaner and safer living conditions. Perhaps the South African government can recognize the crucial role that rural urban migration plays in many South Africans' lives. Rural development initiatives and policies would also be beneficial and would help in decreasing the concentration of opportunities in one city.

Not only is our study a significant contributor in South African literature, but through its methodological innovation and robustness, it enhances the existing global literature on rural-urban migration and the sending households. By empirically investigating the plight of the sending households in the rural-urban migration context as opposed to the common international migration context, it sets itself apart in global literature and provides much needed insight into the effects of rural-urban migration on the rural population.

The contribution of this paper is two-fold. Firstly, as mentioned, our focus will be on the rural sending household and secondly, we will be restructuring the NIDS panel of individuals into a panel of households, making our study a household level study.

We explore the effects of rural-urban migration on three outcome variables: subjective wellbeing, household income per capita and the household monthly income from remittances. The research questions are as follows:

- a.) What is the effect of the rural-urban migration of a family member on the sending households' subjective wellbeing?
- b.) What is the effect of rural-urban migration on the sending households' household income per capita?
- c.) What is the effect of rural-urban migration on the sending households' household monthly income from remittances?

Since our panel data follows a group of households over time, household fixed effects and time effects could be present, and might bias the results. Unobserved heterogeneity that might be present in the sample also has the potential to misrepresent the results. Furthermore, in order to accurately estimate a causal effect, our proposed methodology needs to be able to construct a counterfactual group.

Reverse causality/self-selection is a serious concern when investigating the effects of rural-urban migration. Lower subjective or economic wellbeing scores of the migrant's origin household might have spurred a migrant's decision to migrate. Confounding factors might also bias our results and produce spurious results. Other sources of endogeneity such as measurement error and omitted variable bias, are likely to be present and need to be controlled for.

Hence, we seek to answer our research questions using five methodologies that deal with these issues: Ordinary Least Squares, Fixed or Random effects, Difference-in-Differences, Difference-in-Differences with Propensity Score Matching and Difference in Differences with Instrumental Variables. These methodologies are employed for their ability to root out fixed household-specific characteristics that might bias the results, create a counterfactual against which the treated group can be compared and account for endogeneity and selection bias.

Literature Review/Conceptual Framework

South Africa's well -documented history of apartheid has had significant impacts on the lives of numerous South Africans. Predictably, one of its most consequential effects was on the movement of black South Africans from the Bantustans to the rest of the country. With democracy, in 1994, came an eradication of movement restrictions and an upsurge in the number of citizens migrating to the cities (Posel, 2004).

Since then, the patterns and nature of this migration have been widely studied. (Posel, 2004) found that, contrary to popular belief, migration was taking on a circulatory nature as opposed to the once anticipated permanent one. There was also an increased feminization of rural-urban migration (Posel and Casale, 2003). However, despite rural-urban migration forming a fundamental part of many South African households' survival strategies, there is limited research on the effects of this migration on various factors, in the South African context. To inform policies that are suited to the needs of the population, we need to produce research that sheds light on the effects of rural-urban migration.

Amongst the many effects of migration, perhaps the most intuitive (and overlooked) one is its effect on wellbeing. Mulcahy and Kollamparambil (2016) found that in South Africa, rural-urban migration decreased subjective wellbeing of the migrant by 8.3%; possibly due to false expectations, increased feelings of isolation, and adapting to a new environment. As much as this is the only published study investigating the effects of rural-urban migration on wellbeing in South Africa, its sole focus is on the migrant's wellbeing. There is, therefore, a gap in literature that this paper intends to fill.

The most documented channel in global literature, through which rural-urban migration affects the sending area, is remittances. Although this channel is valid, it does not take into account the psychological and social costs of rural-urban migration as family disruption and prolonged separation usually follow in the wake of migration (Lu, 2012). Because migration is a costly

pursuit filled with uncertainties (Byerlee, 1974), it is often in the migrant's best interests to leave his/her family behind. This often leads to a transformation of social structures within the family and a disruption of family life, which can have detrimental effects on the mental and emotional wellbeing of the remaining household members (Lu, 2010).

Depending on the social dynamics of the rural area, family life and gender roles are also shifted by migration (Chant, 1998). This shift adds to the household's emotional and physical burden due to added responsibilities and diminished labour supply (Taylor et al., 1996). This is more apparent in areas where agriculture is the main source of livelihood, and the left-behind families are left with additional agricultural & household responsibilities after the migration of family members (De Haas and Van Rooij, 2010). From this point of view, it is clear that rural-urban migration perpetuates stressful conditions which can negatively affect physical and mental health (Lu, 2012). Not only that, but these stressful circumstances can be exacerbated when the migrant experiences trying conditions in the city (Lu, 2012).

On the other hand, there is reason to believe that the reconstruction of gender roles and relations brought about by rural-urban migration has positive benefits for the 'left-behind' women's wellbeing (Yabiku, Agadjanian and Sevoya, 2010). (Parreñas, 2008) and (Yabiku, Agadjanian and Sevoya, 2010) suggest that this may be caused by the women's increased decision-making power and newly found autonomy due to their husbands' absence. The emotional benefits might also be complemented by health benefits seeing as the absence of husbands for extended periods tends to reduce the number of childbirths, and widen the inter-birth interval, leading to improved health in some women (Gulati, 1993).

Additionally, the transference of secular values from the migrants may improve the health-seeking behaviour of the left-behind household members if they keep in touch with migrant family members (Hadi, 1999). (Nguyen, Yeoh and Toyota, 2006) reasons that the greater exposure that migrant families have (from the migrant), would result in more knowledge about available health facilities and a more seasoned ability to interact with health care professionals.

In addition to improving the household's economic wellbeing, remittances can also provide health benefits through better food habits and improved nutritional status (Hadi, 1999). The broader community, outside of the migrant households, has a lot to gain too, seeing as some migrants form organisations that seek to upgrade infrastructure, sanitation and health facilities of the sending community (Hefti, 2007). (Ajaero and Onokala, 2019) showed that migrants' remittances and their participation in community development projects played a major role in

the development of rural areas in South-Eastern Nigeria. Studies have shown that remittances play a significant role in migrant households' economic wellbeing; not only are they used for daily transactions, they can also be utilised to purchase land, send children to school and improve living conditions (Ganepola, 2002). Remi

Rural-urban migration and receipt of remittances also can affect the wellbeing of the sending household through a residual psychological channel (Nguyen, Yeoh and Toyota, 2006). The knowledge of having a household member residing in the city could elevate the status of the household in the rural community, thus increasing subjective well-being.

In contrast, reliance on remittances can have a negative impact on the wellbeing of the remaining households. (Kothari, 2002) argued that the remaining household may become "vulnerable through lack of regular and sufficient remittances and other forms of support from those upon whom they are dependent in various ways but have moved away". In certain situations, migrants rely on middlemen to remit, the excessive charges that are sometimes imposed by these third parties can contribute to the debt and stagnation of the sending households' economic situation (Dwiyanto and Kebor, 1997). Several migrants finance their migration through debt (Skeldon, 2003), which leaves the sending household members under a lot of financial strain due to the increased burden of debt.

Generally, remittances are shown to improve the economic wellbeing of sending communities, however, they do not alleviate the emotional pain that comes with separation (Nguyen, Yeoh and Toyota, 2006). In the past, when migration was mostly undertaken by males, it was believed that women and children were the most affected. The patterns of migration have since changed in South Africa; in addition to migration remaining circular, more females are seen to be joining the migration flows (Posel, 2004). Because of this, children and the elderly are becoming more vulnerable to its effects. Most often, the elderly are the ones left with agricultural tasks and demanding childcare responsibilities when their offspring migrates, with no one to take care of them (Bastia, 2009).

Nonetheless, the increased number of women joining the migration flows implies that an increasing number of men are also remaining behind in the rural areas (Pedraza, 1991). The impacts of this are unknown, however, males are unlikely to fill the void of care-giving by filling in the women's family roles (Nguyen, Yeoh and Toyota 2006). This burden then falls on the elderly, while remittances do not provide a satisfactory means of old age-insurance (Nguyen, Yeoh and Toyota, 2006).

Despite rural-urban migration forming an integral part of many South African households' survival strategies, there is a dearth of research into the effects of this migration on the well-being of those that are left behind. This is one of the many contributions that this paper makes. It focuses exclusively on the sending households and restructures the NIDS panel of individuals into a panel of households, making our study a household level study. Not only is it a significant contributor in South African literature, but through its methodological innovation and robustness, it improves upon the existing global literature on rural-urban migration and the sending households. Its empirical analysis of the effect of rural-urban migration on the sending households, as opposed to international migration, ensures that it covers a gap in international literature.

It is imperative that we discover how the sending households are affected so that we are able to develop support structures that are effective in aiding the rural population.

The contribution of this paper is two-fold. Firstly, our focus will be on the rural sending households and secondly, we will be restructuring the NIDS panel of individuals into a panel of households, making our study a household level study.

DATA & DESCRIPTIVE STATISTICS

This study utilises the National Income Dynamics Survey data, which examines the livelihoods of South Africans, over time. This is the first panel household study in South Africa and it is a sample of over 28000 individuals in 7300 households (Brophy et al. 2018). The survey has been conducted every two years, starting from 2008, by the Southern African Labour & Development Research Unit (SALDRU) at the University of Cape Town (Brophy et al. 2018) and tracks individuals over time. We will be making use of all the five waves in this study, and we have restricted the age of sample members to those above 15 years. The restriction on the sample members is included in order to gauge the effect of the migration of an adult family member on the sending household.

Before analyzing it, we restructured the dataset into a panel of households. This panel structure of the data makes it ideal for this study, as it increases the precision of our estimates and allows us to learn more about the dynamics of household behavior over time than is possible from a single cross-section.

Unobservable effects such as different personalities of household members and varying coping mechanisms in households might provide a challenge when it comes to arguing for causality. Panel data allows us to avoid the problem of biased estimators by controlling for household-specific time-invariant unobserved heterogeneity.

In order to track and allocate unique identifiers to households in the dataset, we needed to figure out when new households form and when existing households dissolve. With the help of a NIDS variable that indicates whether a sample member is a mover or stayer in the current wave, we were able to identify individuals that were moving in and out of households.

To identify dissolved households, variables were generated that identified ‘future movers’- individuals whose status in the next wave is ‘mover’. Individuals who stayed in the household after the current wave were identified and termed ‘future stayers’. These movers and stayers were counted in every household and the figures were recorded.

Households that did not comprise of at least one ‘future stayer’ were identified as dissolved households, in the next wave.

The process for identifying newly formed households followed the same process. Using the NIDS variable, ‘stayer’, we were able to identify individuals that had moved in the previous wave, we termed these ‘past movers’. Individuals that did not move since the last wave were labelled ‘past stayers. Households that were comprised entirely of movers and new respondents were identified as newly formed households.

Households that were not comprised entirely of movers and new respondents (i.e. had at least one resident stayer) were tagged as continuing/surviving households.

After successfully categorizing households in the sample as continuing, newly formed or dissolved households, household unique identifiers were then constructed for each household depending on which category it fell into. Continuing households were allocated their first-wave household ID as their panel ID. Newly formed households took on the household ID of the wave in which they were formed, e.g. if a household was formed in the second wave then its panel ID would be its second wave household ID.

All migrants were then dropped from the sample so that we could only remain with household members from the migrant’s origin rural-based households.

This rule-based approach was then used to reconstruct the NIDS individual panel dataset into a household panel.

Using the newly constructed household panel, the households were divided into a treatment group and a control group containing migrant households and non-migrant households, respectively.

Survey participants were asked to answer the question; ‘All things considered, how satisfied are you with your life?’ (Mulcahy and Kollamparambil, 2016). Respondents then ranked their wellbeing with a value between 1 and 10. These are the values that were used to compute the average subjective wellbeing of every household, which was used as one of the dependent variables. The second dependent variable, economic wellbeing, was denoted by deflated values of household income per capita. The ‘remittance’ variable was measured by the total remittances received by the sending household. (Dolan, Peasgood and White, 2008) mention that poor health, unemployment, separation and lack of contact have an impact on wellbeing. Therefore, variables with information about race, gender, marital status, health, employment, income, safety and remittance are included as control variables. Variables about sanitation conditions are also included as control variables, as these are contributors to the subjective wellbeing of people. Details about how these variables were defined are included in the appendix.

In this study, a rural area is defined as a traditional or farmland area, in NIDS terms. We defined a migrant as an individual who has not moved in the first two waves but has moved from a rural to an urban area between the 2nd and 3rd wave (i.e. has a NIDS migration status of ‘stayer’ for the first 2 waves and a migration status of ‘mover’ for the 3rd wave). A non-migrant is an individual who has not moved at all in all the 5 waves.

Consequently, this means that our treatment group was comprised of households where at least one member migrated from a rural to an urban area between waves 2&3, whilst the control group was made up of households in which no members migrated from a rural to an urban area in all the 5 waves.

Since we are interested in the effect of rural-urban migration on the wellbeing of the sending households, urban inhabitants were dropped from the sample so that we could focus on rural dwellers. Individuals who engaged in all other forms of internal migration, namely rural-rural, urban-rural and urban-urban, were also dropped, in order to isolate rural-urban migration.

Descriptive statistics

Table 1: Comparison of outcome variables across waves (Panel sample)

Variable	Sample	Pre-treatment mean	Post-treatment mean	%Change
<i>Wellbeing</i>	Treated	3.99	5.06	+26.82%
	Control	4.18	5.32	+27.27%
<i>Income per capita</i>	Treated	R1776.5	R2060.67	+16%
	Control	R1823.77	R2072.13	+13.62%
<i>Remittances</i>	Treated	R1227.13	R1385.47	+12.90%
	Control	R1116.68	R1220.27	+9.28%

A brief glance at Table 1, tells us that, on average, before and after the migration of a household member, migrant households report lower subjective wellbeing levels than non-migrant households. The average household monthly income per capita for the non-migrant households is also consistently higher than that of the migrant households, in both periods. This could be an indication of self-selection in our sample, where migrants from relatively lower income and lower subjective wellbeing households choose to migrate in search of a better life in the city. This further highlights the importance of our econometric analysis that roots out these statistical issues.

The average subjective wellbeing of the migrant households increases in the post-treatment periods. However, it seems that the subjective wellbeing of the non-migrant households also follows a similar trend, i.e. an increase in the post-treatment period. This motivates the use of econometric methodologies to specifically single out the effect of the migration of a household member on the subjective wellbeing of the left-behind.

We also discover the same pattern in the change in household monthly income for both groups. Both household types experience an increase in household monthly income per capita. However, there is a significant difference in the magnitude of these increases. The household income of the migrant households increases by 35.89% more than that of the non-migrant households. This suggests that the migration of a household member does, indeed, result in an increase in the household monthly income per capita of the migrant households.

Additionally, we note that even though, in our study, the non-migrant households are classified as households that do not have a household member who participated in rural migration, they still receive remittances. This indicates that the migration of a household member is not the

only determinant of remittance receipt. Extended migrant family members can also remit to the left-behind families. Furthermore, it is important to keep in mind that, for the purposes of our study, we defined a migrant as an individual who moved from a rural to an urban area between waves 2 and 3 but some households might have migrant ex-household members who moved prior to the period that our data covers and are still remitting. We also notice an increase in the value of remittances received by both groups, with the treatment group receiving slightly higher remittances than the control group.

From Table 2, we find that there are slightly more female migrants than there are male migrants. Black Africans also engage in rural-urban migration more than the other race groups. Statistical analysis is still needed in order to uncover an unbiased effect of migration on household monthly income from remittances.

Table 2: Characteristics of migrants

Variable	Percentage
<i>Rural-urban migrants</i>	
Migrants	2.92%
Non-Migrants	97.07%
<i>Race</i>	
African	77.79%
Colored	11.78%
Asian/Indian	2.55%
White	8.28%
<i>Age (at time of migration)</i>	
16-29 years	47.78%
30-45 years	30.59%
46-59 years	13.38%
60 years and above	8.25%

<i>Gender</i>	
Female	52.23%
Male	47.77%

Table 3, below, goes on to track the changes in education and employment of the migrant throughout the waves. In line with expectations, by 2017, 55.77% of migrants were employed. This is a significant improvement from the 30.67% of migrants that were employed prior to migration. It is also worth noting that in the second wave, the period before migration, the number of employed individuals in the treatment group had declined by 12.5%, perhaps indicating an economic shock that would later spur them to migrate to the cities in wave 3.

Nevertheless, the number of the economically inactive migrant population is quite high, even after migration. Prior to migration, the economically inactive population was at 38.38%, by 2017, there was a slight decrease to 32.69%. These statistics support our view that the migration pool does not only consist of individuals seeking employment but a significant portion of individuals are also migrating to the cities for educational purposes or other reasons unrelated to employment.

Table 3 also illustrates a steady change in the educational outcomes of the migrant. Whereas, in 2008, 10.19% percent of migrants had reported that they had never had any schooling, by 2017 that number had halved to 5.79%. The number of migrants reporting high school education as their highest form of education also increases slightly over the years. The biggest change, however, can be seen in higher education statistics. By 2017, there was over a 20% increase in the number of migrants that reported having received some form of higher education, compared to the pre-migration period. The slight decrease in the number of migrants with only primary school education makes sense if interpreted together with the subsequent increases in secondary and higher education- as this suggests that some migrants are progressing through the educational levels. This also highlights that education is one of the primary motivators of migration in our sample. These discoveries have implications for how the sending household fares after the migrant's departure.

Table 3: Changes in employment and education statistics of migrants throughout the waves

Employment status	Pre-treatment periods		Post-treatment periods		
	<i>Wave 1(2008)</i>	<i>Wave 2 (2010)</i>	<i>Wave 3 (2012)</i>	<i>Wave 4 (2014)</i>	<i>Wave 5 (2017)</i>
Not economically active	38.38%	50%	28.57%	31.62%	32.69%
Unemployed (strict +discouraged)	18.45%	19.33%	26.62%	9.40%	11.54%
Employed	43.17%	30.67%	44.91%	58.97%	55.77%
Highest level of education obtained					
Primary School	20.06%	13.10%	13.36%	11.27%	10.74%
High School	57.97%	62.88%	62.93%	54.23%	51.24%
Higher Education	11.78%	14.41%	15.95%	26.06%	32.23%
No Schooling	10.19%	9.61%	7.76%	8.45%	5.79%

Research Methodology

We estimated the effect of rural-urban migration on the sending households' wellbeing, using five methodologies; Ordinary Least Squares (OLS), Linear Fixed Effects and Difference in Difference, (DID), Difference in Differences with Propensity Score Matching, and lastly, Difference-in-Differences with Instrumental Variables (IV-DID).

a.) Ordinary Least Squares (OLS)

Ordinary Least Squares is a basic statistical method that is commonly used to estimate linear relationships between two variables. It is a naïve approach to impact evaluation, but it is included for the purposes of comparison. Our model took the following form:

$$Y = \beta_0 + \beta_1(\text{rural-urban migration}) + \beta_2(\text{Covariates}) + u$$

Where Y is the outcome variable (subjective well-being, household monthly income per capita, household monthly income from remittances). 'Rural-urban migration' is a dummy variable denoting whether a household has a migrant or not. The estimates produced by this model have to be interpreted with caution; not only does the model ignore the panel nature of the data, but it also does not take into account the unobserved heterogeneity that might be present in the sample. Furthermore, it does not accurately estimate a causal effect, due to its inability to construct a counterfactual group. Since our panel data follows a group of households over time, household fixed effects and time effects are known to be present, and might potentially bias the results. OLS alone cannot root out these effects, therefore a more robust approach is required.

b.) Fixed & Random Effects

Which brings us to a more panel friendly methodology; Fixed and Random effects models. The Fixed effects model, specifically roots out the household-specific effects might be present in panel data. The model took the form:

$$Y_{i,t} = \beta_0 + \beta_1(\text{rural-urban migration}) + \beta_2(\text{Covariates}) + \alpha_i + Y_t + u$$

Where α_i represents the time-invariant household-specific effects that could potentially contribute to a household's wellbeing. For instance, different coping mechanisms might lead to different wellbeing outcomes.

After estimating a fixed-effects model, immediately estimated a random-effects model, which assumes that fixed effects are not present. In order to choose between the two, we conducted the Hausman test which has a null hypothesis that states that individual-specific effects are uncorrelated i.e. the preferred model is the random-effects model. Rejection of the null hypothesis implies that the more appropriate model is the fixed effects one.

Although they improve on the OLS method, these models suffer from the same limitation; the absence of a counterfactual against which our hypothesis can be compared. Another disadvantage is that the fixed effects model cannot estimate coefficients for time-invariant variables such as gender, which may play an important role in determining the effect on wellbeing. As is the problem with many estimators, unobserved heterogeneity is also not accounted for.

c.) Difference In Differences

An ideal experiment would be a randomized experiment. However, the closest we can get to that standard is by using experimental data to emulate a randomized experiment. We will be using the Difference-in-Difference on the NIDS panel data to achieve that. As mentioned, the sample of households was divided into two groups, a treatment and a control group. The treatment group contained migrant households and the control group contained non-migrant households. A dummy variable, 'Treat' was constructed where a value of 1 denotes households in the treatment group, whilst a value of 0 denotes control group households. A variable, 'Post', indicating treatment periods is also included, where a value of 1 is given to waves 4&5 (post-treatment periods), and a value of 0 is given to wave 3 (pre-treatment period). Waves 1 and 2 were excluded in order to avoid averaging out the pre-treatment effects. The model took the following form:

$$Y = \beta_0 + \beta_1(Treat*Post) + \beta_2(Treat) + \beta_3(Post) + \beta_4(Covariates) + u$$

Where Y is the outcome variable; 'Treat' indicates whether an individual is in a treatment or a control group, and 'Post' indicates whether a wave falls in the pre-treatment or post-treatment phase. The value of the coefficient of the interaction term reflects the impact of rural-urban migration on wellbeing. Difference in Difference helps us to use the observational data to emulate a randomized experiment thus reducing selection bias.

However, in order for our DID results to be meaningful, the parallel trends assumption needs to hold. In this context, this means that in the absence of rural-urban migration, the material

and subjective well-being of both the treatment and control groups needs to follow the same path. Table 4, below shows that for all three of our outcome variables, this assumption holds, this is captured by the insignificant pre-treatment coefficients.

Table 4: Parallel trends test results

Variables	Subjective wellbeing	Income	Remittances
Pre-treatment period 1	-0.441 (-0.367)	-0.0921 -0.0936	0.563 (0.432)
Post-treatment period 1	-0.65 (-0.461)	0.0301 -0.114	0.340 (0.424)
Post treatment period 2	-0.814* (-0.462)	0.152 -0.115	1.130*** (0.416)
Post-treatment period 3	-0.138 (-0.474)	0.0825 -0.116	1.797*** (0.429)
Treat	0.468* (-0.284)	0.0506 -0.0794	-0.536* (0.308)
Time	-0.890*** (-0.053)	-0.277*** -0.0127	-0.495*** (0.0463)
African	-1.047*** (-0.0759)	-0.384*** -0.0268	0.443*** (0.0670)
Married	0.0932 (-0.0618)	0.141*** -0.0185	0.0886 (0.0543)
Healthy	0.185*** (-0.054)	0.009 -0.0137	-0.0737 (0.0474)
Employment	0.0913 (-0.0595)	0.424*** -0.0153	-0.315*** (0.0524)
Religion	0.884*** (-0.0775)	0.0479** -0.0204	0.187*** (0.0682)
Education	0.327*** (-0.0759)	0.182*** -0.0237	-0.0373 (0.0666)
Age	0.00510** -0.00204	0.00849*** -0.000601	-0.00469*** (0.00182)
Household size	0.0958*** -0.0107	-0.116*** -0.00312	0.0762*** (0.00945)
Housing type	0.186*** -0.0704	0.159*** -0.0191	0.186*** (0.0621)
Income	0.446*** -0.032		
Female	0.0983 -0.061	0.111*** -0.017	-0.408*** (0.0537)
Streetlight	0.160**	0.119***	0.0385

	-0.0689	-0.0182	(0.0605)
Refuse removal	0.121	0.163***	-0.105
	-0.075	-0.0214	(0.0660)
Electricity	0.378***	0.137***	0.215***
	-0.0761	-0.0209	(0.0671)
Flush toilet	0.204***	0.0215	-0.219***
	-0.0681	-0.0174	(0.0596)
Piped water	-0.0146	0.165***	-0.0576
	-0.0681	-0.0179	(0.0598)
Safety	0.245***	0.0387***	-0.0593
	-0.0526	-0.0133	(0.0462)
Constant	0.481*	6.469***	-0.900***
	-0.285	-0.062	(0.251)
Observations	12,030	12,030	11,771
Number of HH_PID	4,776	4,776	4,629
Standard errors in parentheses	*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$		

d.) DID with Propensity Score Matching

Propensity Score Matching is a statistical method that aims to reduce bias by balancing covariates between the treatment and control group. This aided us in creating treatment and control groups whose characteristics are as similar as possible. Firstly, propensity scores for each household were created through a logistic regression. This logistic regression estimated the conditional probability of a household being a migrant-sending household given a set of covariates (household size, the gender of household head, employment status, household income, average age, race, religion).

Upon creating propensity scores, observations were matched using the kernel matching algorithm. The kernel matching method matches all treated units with a weighted average of all control units. The weights are inversely proportional to the distance between the propensity scores of the treated and control groups. Lower variance is achieved, due to the utilization of all the control units (Baser, 2006). By utilizing propensity score matching, we ensured that the pre-treatment characteristics of both groups are as similar as possible, thus reducing selection bias.

Any differences noticed between the two groups after successfully matching were then purely by chance and not systematic. This similarity in characteristics also means that in the absence

of rural-urban migration, these two groups will most likely follow parallel trends, thus fulfilling the assumption. After the successful matching, a Diff-in-Diff regression was run.

e.) DID with Instrumental Variables

Endogeneity is an issue that has haunted numerous migration research outputs, and our study is not immune to it. Reverse causality/self-selection is a serious concern when investigating the effects of rural-urban migration. Lower subjective or economic wellbeing scores of the migrant's origin household might have spurred a migrant's decision to migrate. Confounding factors might also bias our results and produce spurious results. Other sources of endogeneity such as measurement error and omitted variable bias, are likely to be present and need to be controlled for. Neither of the models we have listed above sufficiently address this issue. As much as DID and DID-PSM construct a counterfactual group, they also fail to deal with the important issue of endogeneity and do not deal with the effects of unobserved heterogeneity.

For this reason, we set out to utilize Difference-in-Differences with Instrumental variables. Instrumental Variable regression is a statistical method that allows us to get consistent estimates even in the presence of omitted variables. These consistent estimates can only be observed in the presence of appropriate instrumental variables. Good instrumental variables satisfy two properties:

- 1.) Instrument relevance: a good instrument should be correlated with the outcome variable
- 2.) Instrument validity/ exclusion restriction: it should not be correlated with any other determinants of the dependent variable.

Instrumental variables use only part of the variability in the dependent variable- specifically the part that is not correlated with the omitted variables to estimate the relationship between the causal variable of interest and the outcome variable.

Using these guidelines, we chose municipal GDP per capita as one of the instruments for the migration of a family member, when investigating the impact of rural-urban migration on subjective wellbeing. It has been well documented in the migration literature that decisions to migrate are often caused by push and pull factors in the origin and destination places, respectively. If a municipality has a low GDP per capita, then this speaks to potentially low economic activity in that region, which might push residents to migrate to places where their economic wellbeing is secure. Municipal GDP per capita is also not correlated with any other determinants of subjective wellbeing that we did not control for. It is correlated with subjective wellbeing strictly through

migration. It is also strongly correlated with our causal variable of interest, migration of a household member, as shown in Table 7, under the results section.

Our second instrumental variable is the average yearly rainfall per municipality. Weather shocks have been proven in international migration literature, to be correlated with the decision to migrate. Migration literature, around the world, has found that in drier areas, people tend to migrate to areas with more favorable conditions. On the other hand, numerous papers have also come forward with a contrary view – rainfall shocks can be positively correlated with people's decisions to migrate, as favorable agricultural conditions provide capital that can facilitate migration (Gray, 2010). We also find a positive link between the decision to migrate and rainfall in our study.

This is a suitable instrumental variable for migration in our study as it is strictly exogenous and not correlated with any determinants of migration that we did not control for. It is only correlated with either subjective or economic wellbeing through the decision to migrate. Furthermore, the first stage regression displays a strong positive and significant link between the migration of a household member and the quantity of municipal rainfall. Therefore, this makes us confident in the use of average rainfall as an instrument for rural-urban migration.

Two-stage least squares was utilized in the instrumental variable regression, the first stage regression was run to estimate the impact of the instrumental variables on the endogenous independent variable. The equation took the form:

$$\textit{Treatment} = \alpha_0 + \alpha_1 (\textit{Instruments}) + \alpha_4 (\textit{Covariates}) + u$$

Where ‘treatment’ refers to the migration of a household member and ‘instruments’ is municipal GDP per capita and municipal yearly rainfall. Our endogenous treatment variable is binary, as a result, instead of OLS being utilized in the first stage regression, we had to make use of Maximum Likelihood Estimation. The probability of treatment was then predicted from the first stage regression.

In the second stage regression, the predicted values of the probability of treatment were plugged in the DID equation, in place of the treatment variable, as illustrated in the model below:

$$Y = \beta_0 + \beta_1 (\textit{Treat*Post}) + \beta_2 [\alpha_0 + \alpha_1 (\textit{Instruments}) + \alpha_4 (\textit{Covariates}) + u] + \beta_3 (\textit{Post}) + \beta_4 (\textit{Covariates}) + u$$

Table 5: First stage MLE regression estimates for instrumental variable

Variable	Treatment/Migration
Municipal GDP per capita	-2.220*** (0.959)
Municipal Rainfall	0.00558*** (0.0012)
Constant	-1.964*** (0.264)

RESULTS

Table 6: Impact of migration on household's subjective wellbeing

VARIABLES	OLS	FIXED EFFECTS	DIFF-IN-DIFF	DID-PSM	IV-DID
Migration*Post	-	-	-0.249 (0.335)	0.321*** (0.122)	0.589*** (0.104)
Migration	-0.00138 (0.205)	-0.184 (0.411)	0.252 (0.265)	-0.423*** (0.0918)	-0.235** (0.118)
Post			0.908*** (0.0544)	1.005*** (0.103)	0.643*** (0.0743)
African	-1.152*** (0.0698)	-0.0767 (0.581)	-1.090*** (0.0702)	0.409** (0.0582)	-1.109*** (0.0715)
Married	-0.00186 (0.0592)	-0.273** (0.124)	-0.00526 (0.0596)	0.129 (0.0969)	-0.0149 (0.0600)
Relative income	0.389*** (0.0283)	0.318*** (0.0374)	0.392*** (0.0285)	0.062 (0.0454)	0.401*** (0.0285)
Health	0.208*** (0.0542)	0.166** (0.0688)	0.205*** (0.0546)	-0.015 (0.0898)	0.218*** (0.0547)
Employment	0.140** (0.0590)	0.107 (0.0847)	0.0920 (0.0593)	0.053 (0.1006)	0.119** (0.0601)
Religion	0.783*** (0.0781)	0.631*** (0.109)	0.826*** (0.0786)	-0.080 (0.1147)	0.823*** (0.0792)
Education	0.240*** (0.0716)	0.342** (0.171)	0.255*** (0.0721)	-0.097 (0.1034)	0.265*** (0.0722)
Age	0.00674*** (0.00200)	0.0129*** (0.00409)	0.00696*** (0.00201)	-0.0007 (0.0003)	0.00738*** (0.00200)
Household size	0.0775*** (0.0103)	0.0909*** (0.0231)	0.0853*** (0.0103)	0.048*** (0.0142)	0.0865*** (0.0104)
Housing type	0.183*** (0.0696)	0.158 (0.107)	0.156** (0.0701)	0.023 (0.0999)	0.121* (0.0707)
Income	0.323*** (0.0323)	0.177*** (0.0551)	0.330*** (0.0325)	-0.085 (0.0536)	0.324*** (0.0328)
Female	0.177*** (0.0596)	0.217** (0.0981)	0.155*** (0.0600)	-0.152 (0.1019)	0.158** (0.0618)
Safety	0.190*** (0.0531)	0.272*** (0.0670)	0.232*** (0.0534)	-0.069 (0.0907)	0.228*** (0.0540)
Streetlight	0.126* (0.0683)	0.0254 (0.0978)	0.151** (0.0688)	0.008 (0.1359)	0.165** (0.0693)
Refuse removal	0.150** (0.0729)	0.208 (0.139)	0.112 (0.0734)	-0.334* (0.1398)	0.173* (0.0962)
Electricity	0.275*** (0.0751)	0.415*** (0.117)	0.283*** (0.0756)	0.013 (0.1017)	0.235*** (0.0758)
Flush toilet	0.135** (0.0682)	-0.0182 (0.0889)	0.203*** (0.0685)	0.020 (0.1217)	0.227*** (0.0709)
Piped water	-0.0800 (0.0675)	0.0465 (0.0964)	-0.0527 (0.0680)	-0.07 (0.0907)	0.00184 (0.0690)
Constant	0.357 (0.270)	0.882 (0.697)	-0.369 (0.266)	4.196*** (0.0775)	-0.308 (0.272)
Observations	11,552	11,552	11,552	11,012	11,820
R-squared	0.187	0.089	0.174	0.046	0.178
Number of HH_PID		4,615			

Standard errors in parentheses
 *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The first three models displayed in Table 6, above, depict the impact of migration to be consistently insignificant. However, after controlling for self-selection and applying a comparison group using Diff-in-Diff with Propensity Score Matching, the relationship between the origin household's subjective wellbeing and the migration of a household member is revealed to be positive and significant. This corroborates the descriptive statistics displayed in Table 1. According to this model, DID-PSM, the migration of a household member leads to a 32% increase in the sending household's subjective wellbeing. After controlling for endogeneity and confounding factors using Diff-in-Diff with Instrumental Variables, the migration of a household member is seen to lead to a 59% increase in the origin household's subjective wellbeing. Evidently, in our previous models, simultaneity, measurement error and omitted variable bias/ confounding factors were crowding out the effect of migration on the sending household's subjective wellbeing.

The increase in subjective wellbeing can be attributed to a variety of factors and channels. (Nguyen, Yeoh and Toyota, 20016) argues that knowledge of having a household member residing in the city has the potential to lead to an increase in the origin household's subjective wellbeing, through a residual psychological channel. The presence of a city-dwelling household member might lead to an elevation of the sending household's status in the community. As discussed in the literature review, family life and gender roles could experience a shift due to migration (Chant, 1998). This reconstruction of gender roles is likely to have positive benefits for the 'left-behind' women (Yabiku, Agadjanian and Sevoya, 2010). (Parreñas, 2008) and (Yabiku, Agadjanian and Sevoya, 2010) suggest that this may be caused by the women's increased decision-making power and newly found autonomy due to their husbands' absence.

Similar to the evidence provided by (Cummins, 2000), our regression results in Table 5, above, consistently show a positive and significant association between income and subjective wellbeing. This leads us to deduce that as much as the migration of a household member might lead to a decrease in subjective wellbeing due to the psychological effects of separation, this effect was offset by the household's increase in income per capita and remittances, as displayed in Table 7&8, below.

Additionally, the transference of secular values from the migrants may improve the health-seeking behavior of the left-behind household members if they keep in touch with migrant family members (Hadi, 1999). (Nguyen, Yeoh and Toyota, 2006) reasons that the greater

exposure that migrant families have (from the migrant), would result in more knowledge about available health facilities and a more seasoned ability to interact with health care professionals.

Four models, OLS, FE, DID and IV-DID, report that being in a black African household is negatively correlated with subjective wellbeing. Variables that have been proven in the literature to affect wellbeing, are also shown to be consistently significant in our models. Predictably, there is a positive correlation between households that have better health, with their life satisfaction levels. Religion is also seen to be significant and positive in four models, endorsing the numerous findings that depict a positive relationship between religious involvement and life satisfaction levels (Elliot, 1991), (Witter et al., 1985). An increase in household size is also seen to consistently lead to an increase in wellbeing, across all models. This may be due to the presence of a larger support system for each household member, putting them in a position where they are able to better cope with the emotional effect of the migration of a household member (Figley, 1983).

The presence of a streetlight, electricity and a flush toilet are also positively correlated to an increase in wellbeing. This emphasizes the findings by (Bookwalter et al., 2004) that housing and sanitation are positively correlated with life satisfaction levels.

INCOME RESULTS

Table 7: Impact of migration on the household income per capita of the remaining households

Variables	OLS Income	Fixed Effects Income	DID Income	DID-PSM Income	IV-DID Income
Migration*Post			0.0504 (0.0971)	0.111** (0.0406)	0.0503* (0.0303)
Migration	-0.0268 (0.0607)	0.0225 (0.0842)	-0.0729 (0.0760)	-0.267*** (0.0301)	0.322*** (0.0342)
Post			0.275*** (0.0159)	0.271*** (0.0340)	0.228*** (0.0217)
African	-0.280*** (0.0206)	0.183 (0.126)	-0.274*** (0.0206)	0.458*** (0.1764)	-0.325*** (0.0207)
Married	0.159*** (0.0174)	0.0379 (0.0267)	0.155*** (0.0175)	0.0921 (0.0932)	0.138*** (0.0173)
Healthy	0.0481*** (0.0161)	0.00169 (0.0148)	0.0468*** (0.0161)	-0.0558 (0.0870)	0.0468*** (0.0159)
Employment	0.506*** (0.0169)	0.322*** (0.0179)	0.510*** (0.0169)	0.0044 (0.0941)	0.541*** (0.0168)
Religion	0.0760*** (0.0229)	0.0120 (0.0233)	0.0763*** (0.0230)	-0.112 (0.106)	0.0257 (0.0228)
Education	0.188*** (0.0211)	-0.0301 (0.0366)	0.195*** (0.0212)	-0.1025 (0.0996)	0.221*** (0.0208)
Age	0.0109*** (0.000582)	0.00324*** (0.000874)	0.0113*** (0.000581)	-0.0025 (0.0032)	0.0115*** (0.000569)
Household size	-0.117*** (0.00283)	-0.0820*** (0.00487)	-0.117*** (0.00283)	0.0541 (0.0126)	-0.120*** (0.00279)
Housing type	0.178*** (0.0206)	0.0853*** (0.0230)	0.179*** (0.0206)	0.0494 (0.09570)	0.136*** (0.0204)
Female	0.148*** (0.0176)	0.0320 (0.0211)	0.153*** (0.0176)	-0.1637* (0.0979)	0.194*** (0.0177)
Safety	0.0843*** (0.0158)	0.0140 (0.0144)	0.0803*** (0.0157)	-0.0694 (0.0875)	0.0518*** (0.0156)
Electricity	0.121*** (0.0222)	0.0824*** (0.0252)	0.130*** (0.0222)	0.0119 (0.0975)	0.0982*** (0.0219)
Flush toilet	0.0511** (0.0203)	-0.0332* (0.0192)	0.0472** (0.0203)	0.0304 (0.1356)	0.108*** (0.0206)
Piped water	0.297*** (0.0198)	-0.0176 (0.0207)	0.297*** (0.0199)	-0.0789 (0.1159)	0.331*** (0.0198)
Refuse removal	0.103*** (0.0217)	0.0507* (0.0299)	0.103*** (0.0217)	-0.3657 (0.1349)	0.307*** (0.0280)
Streetlight	0.146*** (0.0202)	0.0375* (0.0210)	0.147*** (0.0203)	0.001 (0.1299)	0.179*** (0.0200)
Constant	6.140*** (0.0615)	6.842*** (0.126)	5.774*** (0.0579)	6.551*** (0.0257)	5.587*** (0.0602)
Observations	11,771	11,771	11,771	11,365	12,041
R-squared	0.432	0.178	0.429	0.038	0.434
Number of HH_PID		4,629			

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Looking at Table 6, above, one can see that OLS and FE did not report a significant correlation between a household member's migration and the sending household's income per capita.

To verify the estimates of the models, we employed the much more robust diff-in-diff which aims to emulate a randomized experiment, Diff-in-Diff. Like the first two models, it also could not find a significant effect. However, after matching on observable covariates using Propensity Score Matching, a positive and significant result was revealed. A household member's migration increases the household's income by 11%.

As mentioned, endogeneity is a hurdle that a large number of migration researchers struggle with. In order to reduce bias in our results, we need to adequately account for it. Sources of endogeneity can be reverse causality, omitted variables and measurement error. The most common one when studying effects of migration is self-selection of migrants/migrant households into the treatment group. Households that receive more income on a monthly basis, might have more resources to send migrants to urban areas compared to those with fewer monetary resources. This would bias our results as our regressions would not yield the accurate treatment effect.

In order to mitigate this, we made use of Diff-in-Diff with Instrumental Variables, which, like the DID-PSM model, displayed an increase in the household's income per capita due to the migration of a household member. According to this model, the migration of a household member leads to a 5% increase in the household's income per capita. This figure is quite smaller than the 11% reported by the DID-PSM model.

The positive effect on income is one that is heavily supported by research investigating the same relationship in other parts of the world (Taylor et al., 2010). Depending on the profiles of the migrant, migrant households do tend to experience an increase in cash flows when a household member migrates (Taylor et al. 2010).

The main channel cited in the literature, through which the left behind's household income increases is through remittances. As we will discover from the results displayed in the next section; the outmigration of a household member is positively correlated with an increase in the value of remittances received by the sending household. This is a direct channel through which the sending household's monthly income per capita increases. Nonetheless, the household's income, independent of remittances, can also increase as a result of the reduction in the household size (Datta and Meerman, 1980). If the migrant was not the main breadwinner of the house his departure might lead to an increase in the household's income, seeing as there

are fewer people to survive on a fixed income. If it is a husband that migrated, the remaining woman might have increased autonomy and decision making power, some of which she might use to pursue economic activities that she was not able to participate in, prior to her husband's migration, all of which have the potential to lead to an increased income (Gulati, 1993).

As we have deciphered from the descriptive statistics displayed in Table 3, 70% of migrants reported being unemployed or economically inactive in the period prior to migration. Logically, the migration of individuals that fall within these brackets, unemployed and inactive in the labour market (Afsar, 2002), (Tsegai, 2007), would leave the sending household economically better off, as there are fewer individuals to support on a fixed household income. The cash inflows from remittances as well, once the migrant is settled in the city, would lead to further improvement in the sending household's economic wellbeing.

Covariates such as employment, housing type and gender were found to have a consistent and positive effect on income across all four models. Household size was predictably found to have a negative effect on income, i.e. an increase in household size leads to a decrease in household income per capita (Datta and Meerman, 1980). The sanitation variables were also significant and positive, this might be due to the fact that proper sanitation frees one's time to pursue other economic activities. For example, the presence of piped water is seen to lead to an increase in the household's income. In the absence of piped water, a family member might have been required to travel long distances to fetch water, but due to the presence of piped water, that time is now freed (Tsukada, 2016). Proper sanitation also leads to reduced diseases, and thus less time is taken off work (Hutton, 2010).

REMITTANCES RESULTS

Table 8: Impact of migration on the value of remittances received by the left-behind household

Variables	OLS Remittances	Fixed Effects Remittances	DID Remittances	DID-PSM Remittances	IV-DID Remittances
Migration*Post			0.748*** (0.287)	0.137 (0.107)	0.386*** (0.0898)
Migration	0.504*** (0.179)	1.231*** (0.329)	-0.223 (0.225)	0.266*** (0.0825)	-0.202** (0.102)
Post			0.515*** (0.0476)	0.457*** (0.0904)	0.330*** (0.0646)
African	0.408*** (0.0613)	0.909* (0.493)	0.421*** (0.0615)	0.439** (0.1774)	0.422*** (0.0619)
Married	0.140*** (0.0516)	-0.0968 (0.104)	0.115** (0.0519)	0.102 (0.0937)	0.106** (0.0513)
Healthy	-0.0588 (0.0474)	-0.0981* (0.0579)	-0.0656 (0.0477)	-0.056 (0.0870)	-0.0708 (0.0471)
Employment	-0.360*** (0.0517)	-0.200*** (0.0715)	-0.335*** (0.0519)	0.042 (0.0989)	-0.329*** (0.0519)
Religion	0.195*** (0.0675)	0.171* (0.0911)	0.186*** (0.0679)	-0.103 (0.1066)	0.185*** (0.0676)
Education	-0.0719 (0.0624)	0.0759 (0.143)	-0.0494 (0.0628)	-0.089 (0.0998)	-0.0444 (0.0619)
Age	-0.00693*** (0.00174)	-0.00216 (0.00342)	-0.00539*** (0.00175)	-0.0016 (0.0032)	-0.00531*** (0.00171)
Household size	0.0704*** (0.00892)	0.131*** (0.0194)	0.0704*** (0.00897)	0.048*** (0.0032)	0.0674*** (0.00889)
Housing type	0.196*** (0.0607)	0.0879 (0.0900)	0.203*** (0.0611)	0.0619 (0.0961)	0.194*** (0.0608)
Female	-0.458*** (0.0521)		-0.430*** (0.0523)	-0.1540 (0.0984)	-0.429*** (0.0527)
Street light	0.0383 (0.0597)	0.115 (0.0821)	0.0306 (0.0601)	0.010 (0.1302)	0.0300 (0.0596)
Refuse removal	-0.114* (0.0639)	-0.0492 (0.117)	-0.101 (0.0642)	-0.356*** (0.1355)	-0.0872 (0.0834)
Electricity	0.168** (0.0655)	0.188* (0.0985)	0.207*** (0.0659)	0.014 (0.0974)	0.180*** (0.0651)
Flush toilet	-0.163*** (0.0598)	-0.248*** (0.0751)	-0.202*** (0.0600)	0.0371 (0.1365)	-0.197*** (0.0611)
Piped water	-0.0306 (0.0590)	-0.0494 (0.0810)	-0.0460 (0.0594)	-0.068 (0.116)	-0.0350 (0.0594)
Safety	-0.0150 (0.0465)	-0.0534 (0.0564)	-0.0484 (0.0466)	-0.067 (0.0876)	-0.0503 (0.0464)
Constant	-0.0955 (0.246)	-3.616*** (0.587)	-1.132*** (0.233)	0.693*** (0.0699)	-0.999*** (0.234)
Observations	11,771	11,771	11,771	12,292	12,041
R-squared	0.062	0.065	0.050	0.014	0.050
Number of HH_PID		4,629			

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

OLS reports that the outmigration of a household member is significantly associated with a 0.5 increase in the value of the remittances received by the origin household. After controlling for household fixed effects by running the fixed effects regression, this figure shoots up to 1.23. The Diff-in-Diff regression which creates a comparison group, downsizes this increase to 0.75. After controlling for self-selection using Diff-in-Diff, however, we get an insignificant result. Controlling for confounding factors confirms the results from the first three models- the rural-urban migration of a household member is correlated with an increase in the value of the remittances received by the sending household.

From Table 2, we discovered that the inflow of remittances was not only exclusive to migrant households but non-migrant households reported being recipients of remittances too - perhaps from extended migrant family members or household members that migrated before the period that our sample covers. However, the regression results provide evidence that even though this might be the case, the outmigration of a household member still has a positive impact on the value of remittances received by rural households.

The increase in remittance inflows is not a surprising result, as the prospect of remitting is often a key element in the decision to migrate. Hagen-Zanker (2015) showed that the more integrated migrants are in the labor system, the more likely they are to remit. As we have deciphered from Table 3, only 30% of migrants reported being involved in some type of employment in the period prior to migration, but by 2018 after migration, this number had increased to 56%, further improving the migrant's chances of remitting. By positively contributing to the sending household's income per capita, the inflow of remittances potentially contributes to the improved subjective wellbeing of the sending households observed in the study.

Furthermore, (Niimi et al., 2009) also provided evidence that illustrated how, among other things, the vulnerability of a migrant's life at the destination, their link to relatives back home, and the time spent at the destination affect remittances. This evidence combined with the temporary migration pattern in South Africa adds weight to the theory that migrants act as risk-averse economic agents and send remittances back to the household of origin as part of an insurance exercise in the face of economic uncertainty (Niimi et al., 2009).

Gender, refuse removal and income all have a significant impact on remittances in our models. Male household heads are less likely to receive remittances than female household heads. This might be due to the societal expectations placed upon men, especially in rural areas, where men are seen to be the providers of the household (Hunter, 2006). Whilst an increase in refuse

removal and a flush toilet leads to a decrease in remittances. This speaks to the living conditions of the sending family, according to our results if the sending family is relatively well off, the chances of them receiving remittances from the migrant decrease. Perhaps the migrant might not feel an urgent need to send money back home if the family is in good condition.

CONCLUSION AND DISCUSSION

This novel study set out to investigate the association between the rural-urban of a household member and the subjective & economic wellbeing of the origin household. Using five methodologies that increase in precision & robustness and account for pertinent issues such as reverse causality and fixed effects, we uncovered some interesting results.

From the results laid out in the preceding section, we confidently conclude that rural-urban migration has a significantly positive effect on the subjective wellbeing of the left-behind household. This is in contrast to the migrant's fate in the city as (Mulcahy & Kollamparambil, 2016) provided evidence that the migrant's subjective wellbeing, upon arriving in the city, experiences a decline possibly caused by false expectations and the emotional cost of being away from home.

On the other hand, the psychological effects of separation on the sending household, are offset by the improvement in the households' economic wellbeing through increased monthly household income per capita and remittance inflows. Knowledge of having a household member residing in the city also improves the sending household's subjective wellbeing through a residual psychological channel and the household's status in the community stands a chance of being elevated by virtue of the household members receiving remittances and having a household member residing in the city.

Our descriptive statistics provided insight into the demographics of the average migrant and showed that, as much as a significant portion of migrants are involved in job-seeking activities, there is noticeable activity in educational attainment.

These discoveries led us to assume that the majority of migrants in our sample are migrating from their origin household to the city, in search of either work or education. This suggests another channel, in addition to remittances, through which the sending household's monthly income per capita increases. If the school-going, unemployed and non-labor participant household member migrates then this would lead to an increase in household income per capita,

in the sending household. The household income that was previously used to cater to a relatively larger group of people, would now be distributed amongst a smaller group of people, thus increasing the household income per capita.

The increase in remittance inflows could be as a result of the migrants' integration in the labor market, as depicted by the descriptive statistics. However, there is also evidence that shows that temporary migrants are more like to remit as a form of insurance against economic uncertainty (Niimi et al., 2009). This could be one of the reasons for the increase in remittances observed in our study, as South Africa's migration patterns have since been discovered to be temporary (Posel, 2004), and the economy is currently characterized by high unemployment rates.

Our paper provides a unique perspective on the effects of rural-urban migration in migration literature. In a country where urbanization is rapidly on the rise, it is of utmost importance that we understand how this inevitable process affects the population as a whole. As much as the South African literature on rural-urban migration is emerging, it often focuses on the migrant and ignores the migrant's origin household. Not only that, but the research is often conducted at an individual level. In global literature there is a need for an empirically sound analysis on the effects of rural-urban migration on the sending households, and that is what this study has successfully achieved.

The limitations of our study include the period in which the data is collected; data that spans longer time periods would provide an opportunity for more accurate results. Our panel of households also had to be inferred from individual-level data; if we had a panel of households that was already collected in that form, that would have provided a lesser opportunity for human error. As much as we have tried to account for as many endogenous issues we could manage, the issue of unobservable variables is one that still persists and can be improved upon.

However, by providing an in-depth econometric household analysis of the effects of rural out-migration on the sending household, we hope to have provided a much needed viewpoint on the effects of rural-urban migration, which will aid policymakers in formulating policies that are suited to the needs of the rural population and the migrants, themselves.

DESCRIPTION OF VARIABLES

Dependent variables

- a.) *Wellbeing*- average wellbeing of all the household members'
- b.) *The income per capita*- deflated using 2012 values

Covariates

Treathse1:

1- if the household has an individual that has migrated from a rural area to an urban area between waves 2&3.

0 – if not

Post:

1 – if the wave is 3,4, or 5

0 – if the wave is 1 or 2

Female: (gender of the household head)

1-female

0-male

Marital status (Household head)

1 – if the household head is married

0 – otherwise

Religion (household head)

1 – if the household head is religious

0 – otherwise

Health (average of all the household's members' health)

1 – if the members' perceived health status ranges from excellent to fair

0 – otherwise

Employment (household head)

1 – if the household head is employed

0 – if unemployed

Education (household head)

1 – if the household head received some form of schooling

0 – if the head received no schooling at all

Age (household head)

1 – 0-17 years

2- 18-20 years

3- 21- 29 years

4- 30-45 years

5- 60 years and above

Housing type

1 – if the house is a brick structure on a separate stand or yard, or if the dwelling is a flat/ apartment, or if the dwelling is town/ cluster semidetached house or if the dwelling is a room/ flatlet, or a unit in a retirement village, or a house/room in a backyard

0 – if the dwelling is a caravan/tent, or an informal shack in a backyard, or an informal shack not in a backyard, or hut structure made of traditional matter

For variables; street light, refuse removal, electricity, flush toilet, and piped water:

1- If they were present

0- Otherwise

Safety

- 1- If the respondent reported feeling safe
- 0- Otherwise

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