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Binomial Logistic Regression Analysis of Socio-economic Drivers of Irregular Female Labour Migration from Zimbabwe to South Africa

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ABSTRACT
The study examined irregular female labour migrants from Zimbabwe to South Africa. Specifically, it sought to partial out the socio-economic drivers since the commence of the second phase of migration around 2005. A survey of (n=1200) was employed in three enumeration provinces: Masvingo, Manicaland and Matabeleland South Provinces. The participants were drawn using exponential nondiscriminatory sampling technique. A Binomial Logistic Regression estimation technique was employed to test 15 hypotheses postulated. Findings from the study underscore the centrality of socio-economic drivers in explaining irregular migration by female labour from Zimbabwe to South Africa. Decision making at household level, risk, household dependency and interaction of income and age were found to be major socio-economic drivers of the migration typology studied. On the other hand, income as an economic variable of the study has the greatest dampening effect on irregular migration reducing it by 83.5% underlining Zimbabwe's profound economic crisis. In addition, interaction terms included in the model also underscore importance of interplay of household decision making and risk to reduce irregular migration by 30.4%. Education was found to be less significant as a predictor on its own but became significant as an interaction underlining the fact that most sectors (jobs) irregular female migrants target require less skill. Additionally, the findings show the role played by empowerment programmes coupled with education to dampen irregular migration. The paper has important policy implications including scaling up of awareness on risks and dangers of irregular migration, collaboration between neighbouring governments, empowerment of women and finding a lasting solution to Zimbabwe's long-standing crisis as key policy interventions.

Keywords: Deportees, Labour, Irregular migration, Returnees, South Africa, Zimbabwe

INTRODUCTION

Understanding irregular migration is complex. International Organisation for Migration (IOM) defines it as movement of people usually against existing laws, regulations governing these movements either in going into a place or out of a place of origin, transit or even destination [1][1]. On the other hand, irregular migration is viewed as a, 'multi-faced, dynamic phenomenon that has attracted media and political attention from as early as 2000s' [2]. Zimbabwe has labour migrants located in more than 122 countries around the world [3].

Whilst there is a rich repository of literature on migration, we confine discussions to literature relating to Zimbabwe with respect to the drivers of the phenomenon to keep the study focused. However, before we delve into empirical literature, an overview of theoretical literature is essential. Three main approaches to understanding irregular migration we encounter in literature are; The Gap Hypotheses, irregular migration as State Choice and irregular migration as State Failure [4]. The Gap Hypotheses is premised on the mismatch between national goals of immigration policy on one hand and the resulting outcomes of these policies. On the other hand, State Failure hypothesizes irregular migration as a product of failures by the state of origin. Lastly, State Choice theory postulates that states are in charge and at some point, allow some degree of irregular migration [4]. This study is also grounded on general theories of migration as such as Neo-Classical Theories of Migration, New Economics of Migration Theory, Institutional Theory, World Systems Theory, Network Theory and Cumulative Causations Theory. Apart from the irregular migration theories presented as well as the general theories, this study also takes note of the significance of Aspirations and Capabilities Theory in explaining migration patterns. Migration According to this theory is a function of an individual's capabilities [5].

The three main approaches to irregular migration presented earlier are connected to the hypotheses the study sought to test. The view of migration through the lens of the Gap Hypotheses relates mostly to failure at policy level and its undesired outcomes. For example, hypotheses 4 and hypotheses 15 look into empowerment issues affecting women. In the context studied, empowerment has been a major issue. It is

[1] Available at iom.int/key-migration-terms

also a strategic issue in the National Labour Migration Policy of Zimbabwe launched in 2021. Hypotheses 3 and 5 are concerned with education and land ownership respectively. The government has not done enough over the years resulting in gaps (both in the education and labour markets) which have in fact fuelled migration. On the other hand, hypotheses 8 and 9 manifest State Failure hypotheses. Over the years, travel documents have been difficult to obtain in Zimbabwe due to high costs. This has resulted in actual mobility through regular ways becoming difficult forcing people to opt for irregular migration. The theory of State Choice implies a state which is in charge and in control so that at some point it allows migration. This is problematic and does not closely fit the context studied. Zimbabwe's crisis and its outcomes has been around for more than two decades, it cannot be a state's choice.

Empirically, migration from Zimbabwe is in part explained by preexisting social networks [6]. This particular study examined how irregular migration from Zimbabwe to South Africa's Polokwane region was playing out. The study established that social networks are the main enabler of this pattern of migration as most migrants lack proper documentation. A study on Beit Bridge Border Post focusing on irregular migrants, explore irregular migration at Zimbabwe's busiest port of entry bordering Zimbabwe and South Africa. Results of the study show that issues of documentation, prohibitive fees are major drivers of irregular migration via this border post [7]. On the other hand, a thesis titled *Husband Immobility and the International Migration of Married Women from Zimbabwe,* studied outward migration of married women from Zimbabwe to destinations such as United Kingdom, Canada, South Africa among others. The study was carried out in Gweru; a city located centrally in Zimbabwe. Findings show that social network of women is a vital trigger of migration [8].

Zimbabwe's migration is mixed and is divided into three distinct phases [9]. Most importantly is the third wave of migration which started from 2005 to date. The migration wave from Zimbabwe is *mixed* due to the fact that it is not easy to separate between refugees and economic migrants in a single migration stream as well as tailoring policy responses to address this. Accordingly, Zimbabwe's migration has thus become a standard case study for studying mixed migration [9].

A case study research design was used to understand migration in Mwenezi, a region situated in the southern region of Zimbabwe. The findings show that key among factors leading to this migration included poverty, human rights violations, environmental factors and inaccessibility of travelling passports [10]. Migration from Zimbabwe has also occurred to destinations such as Botswana [11]. Women have been shown to migrate due to a number of factors including economic hardships which was worsened by Covid 19. In addition, in the irregular migration journeys under taken, risks faced robbery, violence and all other forms of abuse. In the same study, the authors call for support from stakeholders such as government so as to ensure safe migration is promoted among women.

Understanding irregular migration of female labour from Zimbabwe to South Africa has important policy implications. For instance, this impacts on attainment of twin Sustainable Development Goals (SDGs): 5[2] and 10.7[3]. SDG 5 focuses on gender equality as well as empowering women and girls. On the other hand, SDG 10.7 focuses on promotion of safe migration. Besides this, irregular migration is a core thematic area of the National Labour Migration Policy of Zimbabwe in existence since 2021.

To the best of our knowledge, studies on migration on Zimbabwe have largely been at a micro scale. With our study, we provide a much broader view of socio-economic drivers of irregular migration from Zimbabwe. We do so by bringing to the fore issues that have not be given special attention in the context studied. For example, issues of empowerment as well as land ownership within the context of migrating women have featured in studies elsewhere but Zimbabwean migration literature has not given them prominence despite them being part and parcel of Zimbabwean society. Besides, contribution to policy, the study has important methodological contributions. Migration studies have mostly taken a qualitative approach. Through employing a quantitative approach, this study adds to nascent migration literature using a quantitative lens.

METHODS AND MATERIALS

3.1 Ethical Considerations, Data Collection and Sampling

Permission (Ref. No. C1/7/C7) to conduct the study was applied for on 08 August 2021 to the Ministry of Home Affairs of Zimbabwe following a recommendation from the University of Mauritius' 53rd Special Meeting of the Higher Degrees Committee on 16 July 2021. Three enumeration areas were used for the study. These are Masvingo, Manicaland and Matabeleland South Provinces. International Organisation for Migration ([1OM],2020) shows that main regions where Zimbabwean migrants come from are: Masvingo 27.9%, Manicaland 19.4 % and Matabeleland South 13.2% hence they were chosen for the study. Due care was also taken to ensure that data collection was not affected by issues of positionality which has

[2] See https://sdgs.un.org/goals/goal5

[3] See https://indicators.report/targets/10-7/

potential to create unequal power dynamics which in turn affect a study such as this [12].

Data for the study was collected from September 2021-March 2022. The sampling units employed consisted of deportees and returnees found in Masvingo Province, Matabeleland South and Manicaland Provinces for the survey to help partial out key socio-economic drivers of irregular migration. A total of 1200 participants were recruited for the survey using exponential nondiscriminatory sampling technique. It involved identifying key informants who then led to recruitment of other participants/multiple referrals. This technique was compatible for the big sample size [13].

For logistic modelling, a sample should be large enough so as to make sure that the results give representative estimates of population parameters [14]. A target sample of 1500 was set , however, 1200 participants were finally recruited for the study distributed as: Masvingo 480; Manicaland 370 and Matabeleland South 350.

DATA ANALYSIS

Binomial Logistic Regression Estimation Technique

The study focused on actual returnees and deportees. The dependent variable used in the study was 'migration' indicating if a participant migrated through irregular means or not. If a participant said 'YES' to irregular migration, it was denoted by 1. If response was 'NO' it was be denoted by 0. Fifteen predictors were arrived at through study of literature as well as study objectives . The econometric model used is given as;

$$ln\left[\frac{p(y)}{1-p(y)}\right] = \beta_0 + \beta_1 Age + \beta_2 Marr + \beta_3 Edu_{level} + \beta_4 We + \beta_5 Yef + \beta_6 Lan + \beta_7 Hhd + \beta_8 House + \beta_9 Doc + \beta_{10} Docpr + \beta_{11} Socnet + \beta_{12} Income + \beta_{13} Sfn + \beta_{14} Decn + \beta_{15} Risk + \varepsilon_i \quad \text{(1)}$$

BINOMIAL LOGISTIC REGRESSION DIAGNOSTIC TESTS

Multicollinearity Tests for Predictors

Our initial results show a high positive multicollinearity of 0.926 between Edu_level and Edu_yrs. The rule of thumb is 0.8. Any variables with values exceeding this are highly correlated which impacts on estimation. We proceeded by dropping Edu_yrs in the regressions that followed. Other remaining variables have correlations below the 0.8 threshold.

Model Specification Tests

A Linktest was performed to check if by choosing Logistic Regression it was the correct functional link between the outcome variable and predictors. This will show if there are no specification errors, UCLA Statistical Consulting Group (2024) Results are presented below;

Table 2: Model Specification Tests Results

Migr	Coef.	Std.Err.	P>z
_hat	1.507	0.356	0.000
_hatsq	-0.166	0.108	0.124
_cons	-0.286	0.274	0.298

From the results above, the variable _hat is statistically significant with probability value of 0.000 implying that our final model is correctly specified. On the other hand, _hatsq is not significant at all levels of significance. As expected, _hatsq should not be significant (UCLA, 2024). Thus, our model is correctly specified. Also, the result shows that the fitted model does no suffer endogeneity since the functional form has been correctly specified.

Goodness of Fit Tests

We conducted Pearson Goodness of Fit Tests to assess the overall fit of the model as presented in Table 7 below. For our model to show that our data fits well, the resulting p value should be more than 5%. This also applies to similar tests such as Hosmer Lemeshow for goodness of fit.

Table 3: Goodness of fit test

Categories	$\chi 2$	Probability
Pearson Goodness of Fit Test	1078.36	0.1869

The results show that both that our model has a best fit since the p value is not significant (since p> 0.1869). Thus, the data fits the model well. This is consistent with Gebrekidan et al., (2021). They posit that for a good fitting logistic regression model, p value should also be insignificant.

RESULTS AND DISCUSSION

For ease of comprehension Table 3 presents a table with full description of interaction terms used in the analysis.

Table 3: Interaction terms used in the study

Variable	Full description
IncAge	Interaction of income and age
WEY	Interaction of women empowerment bank, education level and youth empowerment fund
DR	Interaction of decision making at household level and risk associated with irregular migration
MarrHhd	Interaction of variable married as a marital status and household dependency
DInc	Interaction of possession of travel document and income
LAge	Interaction of land ownership and age

In Table 4, the best fitting model is presented below.

Table 4: Binomial Logistic Regression Results

Variable.	Coefficient	Standard Error	P-Value	M.E. A
Age	-0.211**	0.082	0.010	-2.5
Marr	0.599	0.533	0.295	6.6
Edu_level	0.05	0.139	0.719	0.6
Doc	0.805	1.365	0.555	9.4
Socnet	-0.203	0.327	0.536	-2.4
Docpr	0.088	0.067	0.191	1
House	-0.056	0.257	0.827	-0.7
Hhd	0.125*	0.069	0.070	1.5
Income	-7.118**	3.473	0.040	-83.5
Decn	2.436**	0.991	0.014	28.6
Risk	2.38**	0.959	0.013	27.9
WEY	-0.431**	0.174	0.014	-5.1
DR	-2.592**	1.047	0.013	-30.4
MarrHhd	-0.152*	0.085	0.073	-1.8
IncAge	0.189**	0.083	0.022	2.2
DInc	-1.943	1.378	0.158	-22.8
LAge	-0.013**	0.006	0.037	-0.2
Constant	7.078*	3.645	0.052	0.052
Mean Dependent Variable	**0.847**	**SD Dep. Var.**	**0.360**	
Pseudo R-Squared	**0.103**	**No. of Observations**	**1200**	
Chi-Square	**105.919**	**Prob> Chi2**	**0.000**	
Akaike Criterion (AIC)	**958.356**	**Bayesian Criterion**	**1049.977**	

****** p<.01, ** p<.05, * p<0.1***

Results also include computations for Marginal Effects Analysis (MEA) interpreted in terms of percentage changes. These are more informative than log odds ratios would present [15].

Test for significance of the independent variables

The overall significance of the independent variables of the fitted model presented in Table (5) was checked using a Likelihood Ratio (LR) Test. The results are given below showing the chi-square as well as the degrees of freedom (dF) and probability value.

Table 5: Likelihood Ratio Test Results

Test	$\chi 2$	dF	P value
LR Test	105.92	17	0.0000

Given results above, there is strong evidence (p value of 0.0000) against the null model of no significance of the combined coefficients is rejected. We thus conclude that all the predictors included in the model jointly explain the outcome variable. Further, we can also say that the fitted model is better than the null model.

From the quantitative analysis, the role of income in the dynamics of driving irregular migration studied was important. The findings show that increase in income reduces probability for irregular migration by 83.5 %. This finding underscores the fact that one of the major underlying arguments for outward migration from Zimbabwe (either regular or irregular) has been economic reasons one of the key objectives of the current study. This is finding is congruent with predictions of New Economics Theory and Neoclassical Economics Theories. Similarly, other studies also found that irregular migration journeys by women in South Eastern Asia including countries like Indonesia, Philippines were mostly driven by the desire to get income to support families back home. Preferred destinations cited by the authors include; Malaysia as well as Thailand [16].

From the survey also, as age increases, the probability for irregular migration decreases by 2.5 %. Age is also recognised in migration literature as an important demographic factor and is classified as an important micro level driver of migration [17]. It is important to also point out at this juncture that age is not only important as a biological feature but also as an important social construct. Different cultures the

world over attach varying meanings to different age values as shall be discussed in the findings as well. In a study for Ethiopia, age was found to be a key predictor of intentions to migrate by young people [18]. The only difference with our study is that the focus with these authors is on the intention whereas in our case it is the actual migration which has taken place.

Interaction of land and age show that increase in ownership of land as age increases, irregular migration is reduced by 1.3 %. Land is central in migration dynamics of women and to the economy of Zimbabwe over years. The concept of 'own land 'features prominently in migration literature [19]. To corroborate this, in fact land was found to be important with respect to migration of women [16]. The only difference with the current study is that we interact Land and Age.

Similar to our findings is a study on Ethiopia which underlines the agrarian nature of Ethiopian economy and how land has been pivotal in migration [20]. Our study shows that despite land being important, there has been differential access to it between males and females in Zimbabwe. Analysing further, out of the 1200 respondents, only 15.5 % own land. In sum, we posit that in as much as land ownership is concerned, maturity in terms of age should also be considered for beneficiaries.

The role of education in general is pivotal in migration studies and an important social indicator. Surprisingly, for our study, education is not significant as a stand-alone argument despite carrying the expected sign. The probable explanation is that most migrants especially those who migrate irregularly settle for semi-skilled and unskilled jobs. These call for less educational qualifications. This finding corroborates A Southern African Migration Project (SAMP) Survey of 2007 highlights different categories of migrants who go to South Africa. They end up in sectors such as; agriculture, hoteling as well as domestic work and other sectors which may not be highly regulated. They offer a safe haven for irregular migrants.

Our findings show that collective family decisions at household level help to support irregular migration by female labour hence increasing probability for irregular migration by increasing probability by 28.6%. Decision making at household level is important in general. It is even more important when considering the status of women in Zimbabwean and other contexts. New Economics of Migration Theory reiterates the importance of decision making at the household level. Through decision making arrived at household level, if benefits outweigh disadvantages individuals thus migrate.

Our study shows that risk actually increases probability of irregular migration by 27.9%. Thus, despite all the risks associated with irregular migration, the study has shown that risk has no dampening effect on probability for irregular migration. This finding helps to validate the notion about migration in the context of countries in crisis [9]. The findings are also congruent to a study on irregular migration for Senegal and Guinea partake in irregular migration [21].

Our study also shows that increase in family size escalates dependency resulting in increase in the probability for irregular migration by 1.5%. This finding is consistent with several studies [8; 20; 21]. The study shows that marital status is not significant. Our findings contradict with other studies with respect to the influence of marital status in migration which have shown importance of marital status with respect to migration [8; 10] . In our study, marital status becomes significant when interacted with family size at household. For respondents who are married and have a substantial dependency at household level, the probability for irregular migration reduces by -1.8% and is supported at less than 10 % level of significance. Our conclusion is that, when a respondent is married and have dependency chances are that there is shared with the spouse thus dampening chances for taking the irregular migration route.

In the study, travel document (passport)[4] showed a weak influence on the outcome variable. Only 36.4 % of the respondents had possession of travel documents, this possibly explains the weak influence of document as an argument or it probably explains that when it comes to irregular migration other factors impact more on the outcome variable. If documents are easily available, few women will opt for irregular migration. Despite this, absence of proper travel documentation remains one of the key categories to irregularity in migration literature [22;23]. The other finding which was surprising in the study was the role of social networking in relation to the phenomena studied. In migration literature, social network has an effect of reducing risks and costs associated with irregular migration [21; 25].

In the study, interacting empowerment programs in terms women empowerment programmes, empowerment targeted at the youth as well as education added rigour of the model. The findings show that, increase in empowerment programs coupled with education reduces irregular migration

[4] Main travel document used to travel out of Zimbabwe is passport. Earlier on documents offered on temporary basis to enable travel out of Zimbabwe include Emergency Travel Document (ETD)

by 43.1 %. The result is statistically significant at less than 5 % significance level confirming hypotheses 4 and 15. Other studies corroborate our findings [16;19, 20]. All the studies underscore the strong impact of empowerment on women migration. Our study differs with these due to the role education plays in empowerment programmes a fact we captured in geospatial dynamics analysis earlier. Decomposing the data shows that, 12.8% respondents were beneficiaries of empowerment facility whereas 10.6 had benefitted from youth targeted programmes. All this was against the backdrop of more than 96.6 % of the respondents having attained at least primary education. Thus, given an enlightened population as this finding indicates, incorporating education is central for success of empowerment programs.

In conclusion, this paper has important policy implications including scaling up of awareness on risks and dangers of irregular migration, collaboration between neighbouring governments, empowerment of women and finding a lasting solution to Zimbabwe's long-standing crisis as key policy interventions. The major shortcoming of the study is that it gave standardised responses which do not illuminate the socio-economic drivers partialled out from the survey. A mixed methods research design which makes use of both quantitative and qualitative approaches can be more enlightening. Despite this, the study can be a springboard for future studies for the same context tackling issues such as how empowerment can be calibrated to make it inclusive for marginalised women who have borne the brunt of Zimbabwe's enduring socio-economic challenges.

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