

Estimation of Zimbabwean migration for the period
1992-2012

By

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Thesis submitted in partial fulfilment of the Degree of Master of
Philosophy in Demography

in the
Centre for Actuarial Research (CARE)
Faculty of Commerce
University of Cape Town

January 2020

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ABSTRACT

International migration is the movement of people across national boundaries, and it is an important mechanism for globalisation and economic development. However, in third world countries, it means a large proportion of the population leaving. It is hard to come by statistics on emigration due to the unavailability of sound administrative data systems that record the number of departures from the country. This research seeks to estimate the net number of Zimbabwean migrants for the period 1992 to 2012, by using census data from Zimbabwe and census data from the major receiving countries of Zimbabwean migrants (South Africa and the UK) and data from the Department of Economic and Social Affairs (United Nations 2017e) for other receiving countries. The research also explores alternative estimates of the net number of Zimbabwean migrants implied by other data sources and how they compare to the estimates derived by this research. This research found that the number of Zimbabweans that left the country during the period 1992 to 2012, is between 761,682 and 1,462,620. Furthermore, the results of this research suggest that Zimbabwe is a net emigration country and the net number of Zimbabwean decreased in the second intercensal period compared to the first intercensal period. In addition, the estimates derived in this research show that migration is concentrated in the economically active age groups. Also, a notable increase in the number of female migrants is observed. A comparison of estimates derived in this study to estimates by other data sources indicated that our estimates for the net number of Zimbabwean migrants for the two intercensal periods are plausible.

ACKNOWLEDGEMENTS

I would first want to express my deepest appreciation to my thesis supervisor Professor Rob Dorrington, who has the attributes of a genius. As my lecturer and mentor, he has taught me more than I could ever give him credit for here. He has shown me, by his example, what a good demographer (and person) should be. Without his guidance and continuous help this research would not have been possible, I am gratefully indebted to him for his very valuable comments on this thesis.

I would also like to express my gratitude to the other members of the Centre for Actuarial Research, Professor Tom Moultrie, Dr. Vissého Adjiwanou and Dr. Catriona A. Towriss, for the support throughout my studies. I'm also grateful for the financial support from the Hewlett Foundation during my years of study at the University.

Lastly, I would like to thank my family and friends, for their love and support has always kept me going. Thank you, so much.

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1 INTRODUCTION

Over the last few decades, Zimbabwe, in Southern Africa, has seen a large-scale displacement of its population to neighbouring countries and beyond. According to Crush (2010), Zimbabwe gained independence in 1980 and it made major economic and social advancements in the decade after independence. They further note that after 1990 the social, political and economic changes have led to major population exits, which have contributed to the economic and social collapse of the country. The economy of Zimbabwe has been declining since 2000. The country's gross domestic product (GDP) declined by 46 per cent between 2000 and 2007. The estimates of the number of Zimbabweans that have left the country during this period vary widely.

The Zimbabwean government has not provided reliable statistics on emigration for this period. In such a charged political atmosphere, reliable data would assist the formation of sound policy. The International Organization for Migration (2015), estimates that the number of Zimbabweans living outside the country ranges between 500,000 and 3 million. South Africa is one of the leading destinations for Zimbabwean migrants, the numbers were low during the pre-apartheid era, then 500,000 legal migrants were recorded in 2000, the number increased to 1.25 million by 2008 (Crush 2010). They also note that, unauthorized immigrants are not documented and that there are no records of their numbers, therefore, the numbers of immigrants are underestimated. The second leading destination for Zimbabwean migrants is the United Kingdom (UK). In 2002 there were 56,600 Zimbabweans in the UK, by 2007 the number declined to 39 250 (Crush 2010).

Migration is the third component after fertility and mortality that governs population change. International migration is defined as the movement of people across national borders (United Nations 2017b). It includes those who migrate out of the country and those that migrate into the country. In today's increasingly interconnected world, international migration has become a common phenomenon in every country. The 2030 Agenda for Sustainable Development, recognises that international migration is of major relevance for the development of countries of origin, transit, and destination, requiring coherent and comprehensive responses (United Nations 2017b). According to the United Nations (1998), people who move to a country that is not their usual residence for at least one year are described as long-term migrants, their new country of usual residence becomes the destination country. People who move to a country that is

not their usual residence for a period of a minimum of three months but shorter than one year are defined as short-term migrants. This excludes cases where the movement to that country is for purposes of recreation, holiday, visits to friends and relatives, business, medical treatment, or religious pilgrimage (United Nations 1998).

International migration measures are usually obtained from census data, survey data, and administrative sources. These include formal immigration processes, arrival, and departure records. However, emigration is one of the most difficult components to estimate especially in developing countries, as the emigrants no longer reside in that country and there are no reliable administrative data sources to capture it.

1.1 Main Objective

This research seeks to estimate the net number of Zimbabwean migrants by age group and sex for the period 1992-2012.

1.1.1 Research Question

Can available data be used to produce a reasonable estimate of the net migration from Zimbabwe during 1992-2012?

1.1.2 Specific Objectives

1. To estimate net migration by applying Hill and Wong (2005) method to the Zimbabwean census data.
2. To identify major receiving countries and estimates of overall flow of the Zimbabwean migrants into those countries.
3. To estimate the net number of Zimbabwean immigrants in the major receiving countries.
4. To estimate the net number of Zimbabwean migrants to Africa and to countries outside Africa.
5. To estimate the number of Zimbabwean migrants using alternative data sources and administrative data.
6. To compare the estimates of the net number of Zimbabwean migrants for consistency and draw conclusions about the reasonability of the estimates.

1.2 Importance of the study

There are few attempts made to estimate the number of Zimbabweans that have left the country particularly for the more recent intercensal periods, and the range of estimates is wide, suggesting a high level of uncertainty in the estimates. This research seeks to estimate the number of Zimbabwean migrants during the period 1992-2012, by using

the data from the country of origin and data from destination countries. These estimates will help understand the trend and the level of emigration in Zimbabwe and help in policy making when addressing the problems caused by migration. They can also be used for demographic purposes, that is to understand the sex and age structure of the population from Zimbabwe and in the estimation of adult mortality using Death Distribution Methods (DDM), and incidence of HIV. The estimates can also be used to quantify remittances to the country.

1.3 Motivation of study

Because of the turmoil in Zimbabwe, a lot of the country's inhabitants have left. Most of the migrants leave the country but continue to provide aid to the remaining family members at home. This research seeks to estimate the numbers of Zimbabweans that have left due to the country's economic crisis and political unrest. There are no estimates that provide an understanding of the number and age groups that are living outside the country. This systematic loss of skills, which has accumulated within the country's borders cannot be ignored. These losses have a clear negative impact on a country's development system.

1.4 Outline of the dissertation

This research consists of five chapters. Chapter 1 provides background and motivates the research question. Chapter 2 reviews relevant literature on Zimbabwean migration and the various methods used in estimating net migration. Chapter 3 outlines the data sources and the methods used in this research. Chapter 4 presents the results obtained in this study and lastly, Chapter 5 discusses the reasonableness of the results obtained, limitations and the conclusion to study.

2 LITERATURE

International migration continues to be a problem in most developing countries. The lack of data on migration makes it hard for such countries to design policies that address this issue. It is difficult to measure the relative size of migration due to the unavailability of migration information in both the sending and the receiving countries. Due to this complexity, national statistics and researchers have employed the use of population registers, surveys, and techniques like indirect estimation, residual methods, multiplicity sampling methods, statistical modeling, and data attrition methods to estimate migration.

2.1 Migration in Zimbabwe

The migration of skilled individuals in the southern region of Africa is a major concern as it has long term effects on economic growth (Schachter 2009). The majority of the migrants fall within the economic active ages. According to Crush (2010), the migration patterns in Zimbabwe changed after attaining independence. The country has since experienced elevated levels of outmigration in two racially distinct waves. The first wave consisted of whites leaving due to various government policies and concerns about their future in the country. The second wave consists of black Zimbabweans leaving the country to search for employment due to the economic decline.

The International Organization for Migration (2015), classifies the trend of migration in Zimbabwe into three waves. These are the decade after the independence (the 1980s), the 1990s and the period after the new millennium. They classify those that moved due to the change in government as political migrants, which consisted mainly of whites moving to the UK and to neighbouring South Africa. The 1990s wave was due to the economic and structural changes programme. This led to economic hardships and population exits. They point out that the emigration could also be linked to land invasions and the worsening political crisis. The third wave is the migration from Zimbabwe to South Africa for economic opportunities. The third wave is termed the mixed migration because the group of people moving is a mixture of refugees and economic migrants (Crush, Chikanda and Tawodzera 2015). This idea of mixed migration is also championed by the United Nations Human Rights Commission (UNHCR).

Adepoju (2000) discusses how migration in African countries can be linked to historical, economic, ethnic and political causes, noting that most African countries have had rapid population growth since 1980 but poor economic growth. Zimbabwe has historically been a destination country for migrants, and this changed after independence (Mlambo 2010). The country gained its independence in 1980, and this brought a change to the established pattern of migration, notably a net loss to the country's population. Bloch (2006), argues that migration from Zimbabwe is diverse in characteristics and motivations. First, some migrated due to political and economic reasons and those that leave to study abroad. Second, the skill base of Zimbabwean migrants is dominated by highly skilled professionals and unskilled workers. Lastly, the large numbers of undocumented migrants, those that moved to South Africa unofficially and those that overstayed visas or had their asylum applications rejected.

2.1.1 Gender of migrants

Traditionally Zimbabwean migration was dominated by young males who are migrating for work who went to work in mines in South Africa due to the strict regulation during the Apartheid era (Tevera 2002). Adepoju (2000), argues that women use migration as an avenue to escape. In most African societies, social and political structures define and limit women's involvement in modes of productions. The Southern African Migration Project (SAMP) carries out basic research used for policy-making on the dynamics of international migration to and within the SADC region. Crush, Chikanda and Tawodzera (2015), notes that the SAMP 1997 publication highlighted an increase in the proportion of Zimbabwean women migrants into South Africa and that they participated mostly in cross-border migration. They also note that the SAMP survey from 2005 established that 84 per cent were male and 16 per cent were female respondents. They also established that out of the total Zimbabwean migrants, 44 per cent were females. Research conducted in Johannesburg by Makina (2010) also highlights that one-third of the Zimbabwean migrants that arrived before 1998 were female. From the SAMP surveys, it could be observed that neither men nor women stayed for extended periods in South Africa without going back home (Crush, Chikanda and Tawodzera 2015). This suggests that most Zimbabweans see South Africa as a place where they could go to earn an income and help their households back home.

2.1.2 Brain drain

Brain drain is a process by which valued and talented workers are lost by a country to other countries through migration. Globalisation and aging populations in developed countries presented opportunities for skilled workers from less developed countries (Adepoju 2006). Chikanda (2006) argues that the poor salaries paid in developing countries compared to those in developed countries is the reason most skilled professionals move.

Upon the attainment of independence in 1980, the government of Zimbabwe invested in expanding the quality of the education system, as education was believed to be one of the top determinants of economic development (Ndlovu 2013). However, since the early 1990s, Zimbabwe's valuable human resources have been leaving the country annually in search of better opportunities regionally and worldwide. Chetsanga and Muchenje (2003) note that the period of hyperinflation and the economic downturn saw these numbers increase as migration was used as a survival strategy. In 1991 Zimbabwe was pressured by the International Monetary Fund (IMF) and the World Bank to carry out an Economic Structural Adjustment Programme (ESAP) (Crush, Chikanda and Tawodzera 2015). However, they argue that the Zimbabwe government undertook a reduction of public expenditure by removing subsidies on basic foodstuffs, reducing budgetary allocations to essential social services such as education and health care, and downsizing the public service. The failure of the ESAP programmes brought more economic hardships. Between 1991 and 1997, there were over 50,000 retrenchments by private sector companies, while the public sector lost 20,000 jobs during the same period. Kawewe and Dibia (2000) argue that, the failure of ESAP was largely due to the policies not considering exogenous factors, such as the differences in the capacities in the different economies, and the fact that austerity undermines human capital development and investment and social services resulting in serious negative consequences for the workforce. Furthermore, they note that the combined effects of problems arising from funds and the negative consequences for the quality of the workforce and increased unemployment potentially lead to political crises, social unrest and violence leading to social disintegration.

Research carried out for the Scientific and Industrial Research and Development Centre (SIRDC) on documented Zimbabwean migrants by Chetsanga and Muchenje (2003) concluded that for the period 1990 to 2002, 24.6 per cent of Zimbabwean migrants were trained doctors and nurses, 23.1 per cent were engineers and scientists, 20

per cent were teachers and 16.9 per cent were accountants. Another study done by Makina (2010), on Zimbabwean migrants in Johannesburg concluded that in 2007, from 4,624 Zimbabwean migrants 62 per cent had completed secondary school, 15 per cent had professional qualifications, 10 per cent had post-secondary diplomas and 4 per cent had a university or postgraduate degrees. He argued that the majority of Zimbabwean migrants in Johannesburg are not highly skilled professionals but white and blue-collar workers and skilled artisans. According to Luebker (2008), a labour survey carried out in Zimbabwe in 2004 showed that 6.4 per cent of the Zimbabwean labour force had obtained a diplomas or certificates after secondary school and a further 1.1 per cent held graduate or postgraduate degrees. It also showed that 78.5 per cent of the labour market was unskilled. This suggests that the proportions of Zimbabwean migrants in Johannesburg are not significantly different from the proportions of Zimbabwean population in Zimbabwe.

2.1.3 Internal migration

The movement of people from rural to urban Zimbabwe can help us understand migration in Zimbabwe. After independence, the institutionalised controls, and constraints of the movement of black populations and settlements in urban areas was lifted, allowing black people to live in urban areas. A notable increase in the population in the urban areas followed as rural populations migrated to take advantage of higher urban incomes and better social facilities. According to the 1992 and 2002 Zimbabwean census the intercensal immigration rates to the major two cities of Zimbabwe, Bulawayo and Harare, was 30 and 34 per cent respectively (Potts 2013).

In 2000, the government of Zimbabwe embarked on a programme to fast-track land reform characterised by the expropriation of land from commercial white farmers (Raftopoulos and Mlambo 2008). This resulted in thousands of white people being moved from the farms and many agricultural workers losing their jobs. This caused an increase in the number of migrating to towns to seek employment. In 2005, the government of Zimbabwe embarked on a campaign against all informal housing and employment in the towns, this also affected a lot of livelihoods. This coupled with the collapsing economy, led to exits from the country to seek better opportunities in other countries. Makina (2010) noted that in 2007, most of the migrants in South Africa were from urban Zimbabwe and the motivation for migration was mostly economic and political. He estimated that only 8 per cent arrived before 1999, the rest coming after that.

2.1.4 Age and sex distribution

According to the Department of Home Affairs (2017), young men constitute a larger proportion of those migrating annually. However, it is noted that the migration of women and children is increasing. They also note that the overall trend of emigration has been increasing steadily due to improved transport systems, accessibility to communications as well as push and pull factors. They further classify pull factors as mainly economic and professional opportunities and safety, whereas push factors include large economic inequalities, conflicts, persecution, degraded environments, and climate changes.

The age distribution of the Zimbabwean migrants is mainly concentrated in the working-age group. In a survey carried out by Bloch (2005), of the 1,000 respondents, 68 per cent were males and 32 per cent were females. She found that 32 percent were less than 30 years, 39 per cent were aged between 30 and 39 years and 29 per cent were over 40 years. She further noted that the main reason for leaving Zimbabwe was for better economic opportunities. From the numbers interviewed in South Africa, 55 per cent of the respondents returned home for a visit at least every six months.

Presented in Table 2.1 below are the demographic characteristics of Zimbabwean migrants from the SAMP survey conducted by Crush, Chikanda and Tawodzera (2015). The feminisation of migration can be observed from the three surveys. In addition, the highest proportion of the number of migrants is in the 25-44 age group in 1997 and the 25-39 age group in the 2005 and 2010 surveys. According to the 1997 and 2005 surveys, most of the migrants were married and by 2010 there was a notable increase in the proportion of unmarried migrants. From these observations, most Zimbabwean migrants were relatively young.

Research done by Makina (2010), confirms that the majority of Zimbabwean migrants in Johannesburg were of working ages. He estimated that 80 per cent were between the ages of 20 to 40 years and that very few were under the age of 20 or above the age of 50.

Table 2.1: Demographic profile of Zimbabwean migrants

	1997	2005	2010
sex (%)			
Male	61	56	56
Female	39	44	44
Age years (%)			
15-24	26	15	31
25-39 (25-44)	(50)	56	59
>40 (>45)	(23)	24	10
Marital status (%)			
Married	66	58	41
Formerly married *	8	11	10
Unmarried	25	31	49

source: Crush Jonathan, Abel Chikanda and Godfrey Tawodzera (2015:page 368)

2.1.5 Estimates of the number of migrants

It is difficult to quantify accurately the number of Zimbabweans living outside Zimbabwe, due to large numbers of undocumented migrants. Fieldwork conducted in Zimbabwe in 2017 found no evidence of any mechanism for collecting comprehensive migration-related data on departures and returns of Zimbabweans at designated ports of entry (Chereni and Bongo 2018). There are estimates available for different time periods: the International Organization for Migration (2015) estimates that the number of Zimbabwean migrants residing outside of Zimbabwe by the end of 2014 was between 500,000 and 3 million. Another set of estimates by Chetsanga and Muchenje (2003), indicated that 479,348 Zimbabwean migrants left the country in the period 1990 to 2002. According to the United Nations Population Division (2013) estimates, by 2013 571,970 Zimbabwean migrants were residing in the top five countries to which Zimbabweans moved (South Africa, United Kingdom, Malawi, Australia, and Botswana).

Other estimates by Crush (2010), suggest that around 500,000 Zimbabweans crossed legally into South Africa by 2000 and that the figure rose to 1.25 million by 2008. This period coincides with the period in which the government of Zimbabwe implemented policies that affected most of the urban population. Other research on Zimbabweans in Johannesburg by Makina (2010) indicates that there were 1,022,965 Zimbabwean migrants in South Africa in the year 2007. He used the 2001 South African census as the baseline, which estimated that there were 131,886 Zimbabwean-born nationals and that 80 per cent were living in Johannesburg. He then used this census estimate and applied annual population growth rates derived from his survey, assuming

that these annual growth rates for the Johannesburg Zimbabwean population were the same for the total population of Zimbabweans in South Africa.

Due to the absence of reliable estimates of Zimbabwean migrants, indirect evidence such as deportation figures have been used (Muzondidya 2008), although this is not a reliable source of data as one cannot distinguish between a first-time offender and those that are multiple offenders resulting in multiple counts. The figures presented by the Home Affairs show a notable increase in the Zimbabwean offenders over the years, approximately 17,000 in 2001, 74,765 in 2004, 97,433 in 2005 and 102,413 between January and June 2007 alone (Muzondidya 2008). These suggest an increase in the number of undocumented Zimbabwean migrants in South Africa.

Turning to the UK, Humphris (2010) argues that there are no actual figures on the number of Zimbabwean migrants in the UK. She notes that the 2001 UK census recorded 49,303 Zimbabweans, which is a 130 per cent increase in the 1991 census figure of 21,427 Zimbabweans. Furthermore, she notes that this increase in the number of Zimbabweans can be explained by the expansion of the National Health Service in the UK attracting doctors and nurses, as well as the political unrest in Zimbabwe.

The OECD (2017); Oecd.Stat (2017)¹ compiles migration estimates to and from their member countries in their statistical database. They provide data on the migration flows and migration stocks from four data sources to derive their estimates, namely population registers, residence permits, labour force surveys and censuses. However, they note that it is difficult to measure some population groups, such as asylum seekers and illegal residents as asylum seekers are generally only classified as migrants when they are granted permission to stay. Table 2.2 shows the stock of Zimbabwean migrants in each year from 1996 to 2012 in the OECD countries and the total numbers in the UK. The number of Zimbabweans in the UK is above 50 per cent of the total number of migrants in OECD countries.

¹ Organisation for Economic Co-operation and Development <http://stats.oecd.org/>

Table 2.2: Stock of Zimbabwean-born population in the OECD countries

Year	Total	UK	% in the UK
1996	106	...	0%
1997	10,066	...	0%
1998	10,427	...	0%
1999	11,656	...	0%
2000	12,095	...	0%
2001	26,703	...	0%
2002	30,060	...	0%
2003	29,211	...	0%
2004	30,587	...	0%
2005	36,106	...	0%
2006	158,907	111,000	70%
2007	158,225	106,000	67%
2008	145,556	101,000	69%
2009	175,810	126,000	72%
2010	165,768	111,000	67%
2011	206,438	137,000	66%
2012	168,415	125,387	74%

Source: <http://stats.oecd.org/Index.aspx?DataSetCode=MIG>

Note: ...= missing

Other attempts have been made to estimate international migration in the UK, using the International Passenger Survey (IPS). This is a continuous sample survey done by the Office of National Statistics and it collects information about UK inbound and outbound migration, and UK international travel and tourism. To ensure that it is representative it is stratified by mode of travel, route and time of day. To produce national estimates of immigration and emigration by country of origin/destination, citizenship, age and sex, the information collected by the survey is weighted. The IPS estimates that between the year 2000 and the year 2009 the net number of Zimbabwean immigrants to the UK was 48,187 (Raymer, Abel, Disney *et al.* 2011).

Table 2.3 shows the number of Zimbabwean migrants in different years in the UK, South Africa, Africa and the World (that is in total living outside Zimbabwe). According to the Department of Economic and Social Affairs (United Nations 2017e) data, the numbers of Zimbabweans living outside Zimbabwe have increased over the years. From Table 2.3, it can be noted that the proportion of Zimbabwean migrants in the UK has slightly decreased over the years. The proportion was over 50 per cent from 1990 to 2010 and thereafter a slight decrease to 48 per cent. However, the proportion of

Zimbabwean migrants living in South Africa has continued to increase over the years, accounting for more than 50 per cent of the number of Zimbabwean migrants in Africa from the year 2000, rising to over 80 per cent in 2017.

Table 2.3: Zimbabweans' migrant stock at mid-year for both sexes by country of destination 1990-2017

Year	Country or Area of destination					Percentage of UK to the total Outside Africa	Percentage South Africa to the total in Africa	Percentage South Africa and the UK to the total
	UK	South Africa	Outside Africa	Africa	World			
1990	20,857	61,875	40,937	135,760	176,697	51%	46%	47%
1995	34,085	82,744	61,734	190,903	252,637	55%	43%	46%
2000	47,888	127,073	85,289	225,464	310,753	56%	56%	56%
2005	79,861	220,867	152,655	326,180	478,835	52%	68%	63%
2010	118,337	470,423	225,263	588,679	813,942	53%	80%	72%
2015	112,132	604,248	234,177	732,605	966,782	48%	82%	74%
2017	117,873	649,385	244,650	780,554	1,025,204	48%	83%	75%

Source: United Nations (2017e)

2.2 Data sources

The main sources of data used to track migration are national surveys, administrative sources (such as asylums and permits) and border control data. Schoumaker and Beauchemin (2015) argue that administrative statistics on the flows of immigrants are mainly limited to developed countries and even these are not perfect. They note that most developing countries are limited to only census data. This allows the estimation of stocks of the migrants (the numbers of migrants living in a country or region at a given point in time) but less information on the flow (the number of migrants entering or leaving a country or region during a specific period). These sources are not always comparable due to the differences in the purpose, the coverage, and the measurement.

Azose (2016) argues that high-quality data on migration stock is relatively easy to come by compared to migration flows. Mainly due to the way the two types of migration data are collected, for tracking migration flows it requires border monitoring and a population register that is up to date, which most developing countries do not have, whereas stocks can be estimated by including a place of birth question on the census.

2.2.1 National surveys

Survey instruments can be the most powerful tool in collecting data. Data are obtained through questionnaires. Censuses and surveys are universal, and they allow comparison and provide information on small population groups. The main use of a population census is to provide key information used in policymaking, planning, and administration. Censuses are deemed a useful source of the number of migrants residing in a country at a given point in time, socioeconomic characteristics, and emigration figures but are limited when it comes to migrant flow. Censuses are affected by coverage; sample size and migration questions being omitted. The core topics recommended by United Nations Statistics Division for capturing migration data are; country of birth, country of citizenship and year or period of arrival in the country of foreign-born persons (International Organisation of Migration 2018; United Nations 2014a). Estimates of intercensal net migration can be obtained by using the two sets of census data from two-time points and estimates of births and deaths between the censuses. Due to the economic challenges in Zimbabwe, the only source of data that can be used to analyse migration are the censuses and these are carried out every ten years. During the period of interest, there have been three censuses in Zimbabwe, that is 1992, 2002 and the 2012. These censuses collected information on the country of birth, place of usual residence and where one was living at the time of the previous census.

Sample surveys are similar to the National census but they cover a limited number of units, which represent the entire population. These can be either cross-sectional, that is, they are conducted at a point in time or longitudinal where a subject is followed over a period. Household surveys are best at measuring characteristics and the impact of migrants and migration that is using data from sending and receiving countries on migrants themselves (ACP Observatory on Migration 2011). According to Schachter (2009), Zimbabwe has had national household surveys such as the Intercensal Demographic Survey, the Income, Consumption, and Expenditure Survey and the Labour Force Survey. He also notes other externally funded surveys such as the Demographic Health Survey, the World Health Survey and the Child Labour Survey but he points out that these have very limited information on migration.

2.2.2 Administrative registers

These are used to measure the stock and flows of international migrants. They are less common in developing countries due to the costs of setting up and maintenance. They capture information on the in-flow and outflow of migrants. They capture information

on characteristics such as age, sex, education, and occupation. They are more current than other sources of data as they allow estimates to be produced at quarterly and annual intervals.

South Africa is one of the African countries that keeps records of asylum seekers/refugees maintained by the Home Affairs ministry (Schachter 2009). Valuable information such as date of birth, country of birth, nationality, sex, residency in the past ten years, education attained, and profession is recorded. This data provides information on the trend and characteristics of migrations but not the magnitude, due to the limited coverage of registers. Information on short-term visitors in the country is undocumented and those that leave the country are not deregistered. The differences in countries' criteria for the inclusion of foreigners in the flow data makes it difficult to compare across countries. Jensen (2013) posits that the major challenge in using population registers when estimating emigration is that population registries are not centralised. There is also variation in data provided to central offices from different municipalities and coverage differentials. He further notes that migrants that leave families and undocumented migrants can cause a bias in the estimates produced.

2.2.3 Visa and border data

Sources of visa and border data include information collected at international borders, such as type of visa issued (both before and after entry into the country), or entry and exit cards. These enable migrants to be categorized, mainly as student-based, employment-based or family-reunification based. Visas are often used to measure labour migration flow and exit visas can be used to measure emigration. The quality and coverage of these data differ between countries due to differences in border policies and the permeability of the borders (ACP Observatory on Migration 2011). Also, the usefulness of these data can be enhanced by using proper computational programmes and techniques. These data can be useful in estimating immigration, but in the case of Zimbabwean immigrants to South Africa, there are many illegal migrants who use unofficial entry into the country, as a result, they are not captured. Therefore, with the use of these data, we can only get the distribution of the migrants but not the total numbers due to unaccounted numbers of illegal migrants.

2.3 Methods of estimating migration

2.3.1 Residual methods

The residual method is a common indirect method for obtaining net migration.

According to a handbook published by the Department of Economic and Social Affairs Statistics Division (United Nations 2017a), net migration flow is the number of persons who entered to reside in the country less than the number of those who left to reside in another country during the intercensal period. Net migration is the difference between two populations that is not accounted for by births and deaths when a population is enumerated at two points in time using the same data source (Warren and Peck 1980). These methods require reasonable estimates of mortality and fertility and most importantly the assumption of no differential in completeness of the estimates of the population at the start and end of the period. The estimate derived from this method is termed net migration flow.

According to the Department of Economic and Social Affairs Statistics Division United Nations (2017a) residual methods use the intercensal component equation. Net migration is estimated as a residual, the difference between the first and the second census is equal to the natural increase and net migration. They define natural increase as the difference between the number of births and the number of deaths in the country during the intercensal period. Described below in detail are the common variations of the residual method.

2.3.1.1 *Estimating net migration using the intercensal component method*

In this method, the difference between the two populations is the combined result of natural increase and net migration. Net migration is immigration minus emigration. Natural increase is equal to births minus deaths as follows:

$$(P_1 - P_0) = (B - D) + (I - E) \quad (1)$$

where P_1 is the total population at the second census, P_0 is the total population in the first census, B are the intercensal births, D are the intercensal deaths, I and E are the intercensal immigration and the emigration respectively. $(P_1 - P_0)$ is the net change in population between censuses, $(B - D)$ is the intercensal natural increase, and $(I - E)$ is the intercensal net migration. Thus, to obtain intercensal net migration one should rearrange the equation (1) as below:

$$(I - E) = (P_1 - P_0) - (B - D) \quad (2)$$

A positive net migration indicates that more people came in than those who exited, and a negative net migration indicates that more people exited than those who entered.

2.3.1.2 Estimating net migration using the intercensal cohort component method

This variation of estimating intercensal net migration is commonly used for countries that have reliable vital statistics. It requires survival rates by age group and sex. These can be obtained from an appropriate life table or derived using the census itself or from household surveys. The basic approach of this method is to project forward the survivors from the first population to the time of the second population estimates, and then subtract this expected number from the enumerated population to get a residual. This residual is an estimate of the net number of migrants alive at the time of the second census. To estimate the net migration for a population that was already born in the first census where x is greater than t , one uses the equation below:

$$({}_5I_x - {}_5E_x) = {}_5P_x^1 - {}_xS_{x-t} \times {}_5P_{x-t}^0 \quad (3)$$

where $({}_5I_x - {}_5E_x)$ is the age-specific net migration for the cohort aged x at the time of the second census, calculations are done for each sex. ${}_5P_x^1$ is the population in the aged x to $x+5$ enumerated at the second census, ${}_5P_{x-t}^0$ is the population aged $x-t$ to $x-t+5$ at the first census and t is the number of years between the two censuses. ${}_xS_{x-t}$ is the survival rate for the age cohort for the intercensal period. For the cohort born between the censuses, the net number of surviving migrants is given by:

$$({}_tI_0 - {}_tE_0) = {}_tP_0^1 - S \times B, \quad (4)$$

where B represents the number of intercensal births being projected forward to the second census. This approach underestimates the number of migrants since it does not include the number of migrants who died during the intercensal period. Using the second population as the starting population and projecting backwards, this approach overestimates the number of potential migrants as it includes the number of migrants who died before migrating. According to Siegel and Swanson (2004), dividing by a correction factor, which is the square root of the survival ratio that represents survival for half the period, attenuate for this bias, as follows;

$$({}_5I_x - {}_5E_x) = ({}_5P_x^1 - {}_xS_{(x-t)} * {}_5P_{(x-t)}^0) / \sqrt{{}_xS_{(x-t)}} \quad (5)$$

$$({}_tI_0 - {}_tE_0) = ({}_tP_0^1 - S * B) / \sqrt{S} \quad (6)$$

2.3.1.3 Estimating net migration using the method by Hill (1987)

Uncertain accuracy, and availability of reliable data sources, limits the use of standard methods. To estimate net migration Hill (1987) proposed a method that makes use of census and survey data in a simplified way. It can be used to provide estimates for emigration when applied to a locally born population. The method uses a similar residual approach being applied to age groups, not cohort. This method can also be used with intercensal periods, that are not a multiple of 5 years or an integer number of years.

Using two successive censuses the method states that, the population ${}_5P_x^2$ which is the number of people in an age x to $x + 5$ group at a time $t + n$ is equal to the initial population ${}_5P_x^1$ which is the number of people at time t in the same age group plus intercensal entries less intercensal losses. The equation is as follows:

$${}_5P_x^2 = {}_5P_x^1 + B_x - B_{x+5} - {}_5D_x + {}_5NM_x, \quad (7)$$

where B_x and B_{x+5} are the number of people entering and leaving the x to $x + 5$ age group through having birthdays at age x and age $x + 5$. Persons aged $x - 5$ to x at the first census will have their x^{th} birthday between the two censuses provided that they do not die and persons aged x to $x + 5$ are those that survived and had their x^{th} birthday between the censuses. B_x is estimated using the equation below,

$$B_x = (t / 5) \times ({}_5P_{x-5}^1 \times {}_5P_x^2)^{1/2} \quad (8)$$

where t is the time in between the censuses ${}_5D_x$ represents the deaths for the population aged x to $x + 5$ and which is estimated as follows,

$${}_5D_x = t \times {}_5m_x \times ({}_5P_x^1 \times {}_5P_x^2)^{1/2}, \quad (9)$$

where ${}_5m_x$ is the age-specific mortality rate.

${}_5NM_x$ is the age-specific net number migrants aged x to $x + 5$, and can be estimated by rearranging equation (7) as follows;

$${}_5NM_x = {}_5P_x^2 - {}_5P_x^1 - B_x + B_{x+5} + {}_5D_x \quad (10)$$

Hill and Wong (2005) applied this approach to estimate the number of Mexican immigrants to the United States of America for the period 1990 to 2000.

2.3.1.4 Estimating net migration using death distribution methods (Hill and Queiroz 2010)

Hill and Queiroz (2010) argue, that the general projection approach is sensitive to change in census coverage. They propose a method which is an extension to the Growth General Balance (GGB) method. GGB is a generalisation of the Brass Growth Balance method (Brass 1975), for evaluating the completeness of death registration comparative to a census age distribution for a stable population. The difference between this method and that of Hill (1987) is that in this method the estimate of net migration is derived iteratively.

From the demographic balance equation, the population change over time is equal to the total entries from births and immigrants minus the total loss from deaths and emigrants. The equation can be expressed as rates as presented by Bhat (2002),

$$r(a+) = b(a+) - d(a+) + nm(a+), \quad (11)$$

where $r(a+)$ is the growth rate of the population aged a and over, $b(a+)$ is the partial-birth rate at which people come into a segment by attaining a^{th} birthdays, $d(a+)$ is the death rate of people aged a and over, and $nm(a+)$ is the net migration rate for the population aged a and above. According to Hill and Queiroz (2010) it can be expressed as follows,

$$nm(a+) = k_{nm} + q_{nm} \times nm^s(a+) \quad (12)$$

in which q_{nm} is a constant that relates the quantum of migration, $nm(a+)$ in the actual population to the migration in the standard $nm^s(a+)$, k_{nm} is a constant and,

$$nm^s(a+) = \frac{\sum {}_5nm_x^s \times {}_5PYL_x}{\sum {}_5PYL_x} \quad (13)$$

where PYL represents the person-years lived and ${}_5nm_x^s$ is a standard model net migration rate.

Using parameter values suggested by Rogers and Castro (1984) the model variation is as follows:

$$m(x) = 0.02 \exp(-0.1 \times x) + 0.1 \times \exp(-0.1(x - 20) - \exp(-0.4(x - 20))) \quad (14)$$

Hill and Queiroz (2010), modified this to include return migration by adding a double exponential term as shown below.

$$m(x) = 0.02 \times \exp(-0.1x) + 0.1 \exp(-0.1 \times (x - 20) - \exp(-0.4(x - 20))) - 0.02 \exp(-0.125(x - 55) - \exp(-0.4(x - 55))) \quad (15)$$

The method was applied to the Mexico and Puerto Rico 1980-2000 data, with the return migration peak set to age 55. To estimate the number of birthdays age a , $B(a)$, for a five-year age group one uses the equation (8).

A set of age-specific mortality rates ${}_5m_x$ is applied to the average intercensal population, to estimate the average annual number of intercensal deaths $D(a+)$ as follows:

$$D(a+) = \sum_{x=a}^W {}_5m_x \times [({}_5P_x^1) \times ({}_5P_x^2)]^{1/2} \quad (16)$$

To estimate the rates from the equation above one needs to divide the average number of events by the persons-years of exposure of people aged a and over, $PYL(a+)$, which is equal to the geometric mean times the length of the intercensal period, that is.

$$PYL(a+) = (t_2 - t_1) [P^1(a+) \times P^2(a+)]^{1/2} \quad (17)$$

The population growth rate, $r(a+)$, is estimated from the first and the second populations aged a and over, that is.

$$r(a+) = (1/t) \times \ln[P^2(a+) / P^1(a+)] \quad (18)$$

The partial-birth and death rates are estimated as follows:

$$b(a+) = \frac{B(a+)}{PYL(a+)} \quad \text{and} \quad d(a+) = \frac{D(a+)}{PYL(a+)}.$$

2.3.1.5 Estimating migration bilateral flows from stocks

Migrant stock data measure the net cumulated number of migrants up to a particular point in time residing in each country by their country of birth. Bilateral migration data are usually presented in a square table, with the place of origin in the rows and the place of destination in the columns. The off-diagonal entries representing migration and the diagonal entries representing the native-born residents.

A migration flow is defined as the total number of persons arriving or leaving a given country throughout a specific period (Abel 2013). Considering two migration stock tables at a time (t and $t+1$), one can estimate bilateral migration flows y_{ij} from origin i to destination j by finding the difference between the migration stock at the beginning and the end of the period and setting all negative differences to zero. As presented by Abel and Cohen (2019);

$$y_{ij} = \begin{cases} s_{ij}^{t+1} - s_{ij}^t & \text{if } s_{ij}^{t+1} > s_{ij}^t \text{ and } i \neq j, \\ 0 & \text{if } s_{ij}^{t+1} \leq s_{ij}^t \text{ or } i = j, \end{cases} \quad (19)$$

where s_{ij}^t and s_{ij}^{t+1} are the number of migrants born in i and residing in j , at the time t and $t+1$, $i = 1, 2, \dots, R$ and $j = 1, 2, \dots, R$ for R places of birth and residence.

However, for the sake of robustness, Beine and Parsons (2015) propose that all negative flows constitute return migration. In other words, they sum the initial positive flows between countries i and j , and the absolute value of the negative flow from j to i .

Abel (2013) presented a method for estimating the number of migrants from each place of birth, in each place of residence using the following spatial interaction model,

$$\log y_{ijk} = \log \alpha_i + \log \beta_j + \log \lambda_k + \log \gamma_{ik} + \log \kappa_{jk} + \log \delta_{ijk} I(i = j) + \log m_{ij}, \quad (20)$$

where y_{ijk} represents the number of migrants who transition from origin i to destination j of the people born in birthplace k , in a given time interval and $i, j, k = 1, 2, \dots, R$, for R regions, destinations and birthplaces.

The α_i, β_j and λ_k parameters represent characteristics relating to the origins, destinations and birthplaces respectively, and γ_{ik} and κ_{jk} represent the combination factors specific to each origin-birthplace and destination-birthplace respectively.

To parameter δ_{ijk} , which represent the factors specific to each set of stayers is added to account for stayers and $I(i = j)$ is an indicator function, it takes the value of 1 if $i = j$.

The m_{ij} factor represents the auxiliary information from on migration flows from origin i to j .

According to Willekens (1999), in conventional spatial interaction analysis, $m_{ij} = F(d_{ij})$ where $F(.)$ is a distance deterrence function and d_{ij} is the distance between i and j . Furthermore, he notes that m_{ij} can represent the travel costs or past migration flows.

Del Fava, Wiśniowski and Zagheni (2019) argue that migration data sources have their characteristics and potential drawbacks. To gain a better understanding of the causes and consequences of international population migration movements, migration scholars, official statisticians, and policymakers must overcome the inherent limitations of the various data sources that each country uses to produce statistics on migration, and especially on migration flows (Del Fava, Wiśniowski and Zagheni 2019). They proposed that a possible solution to the problem was to combine the information from all the available data sources. To model international migration flows from 2002 to 2015 among 31 European countries, they built on an existing hierarchical Bayesian model

within the Integrated Modelling of European Migration (IMEM) project by combining data from administrative data sources and the EU Labour Force Surveys (LFS). First, they estimated migration flows to all of EU/EFTA countries by generalizing previous work by (Wiśniowski 2017) on LFS data to estimate migration flows from Poland to the UK. Second, they defined source and country-specific measurement error models, to accommodate the different characteristics of each data source. Third, they modified error models by Raymer, Wiśniowski, Forster *et al.* (2013) and Wiśniowski (2017) linking them through a migration parameter derived from their migration model.

It is evident from the review of the literature that there is little agreement on the estimates of the net number of Zimbabwean migrants. This is due to the complex nature of migration and the lack of quality data. This research attempts to estimate the net number of Zimbabwean emigrants from census data for the period 1992-2012. It also aims to use the major destination countries of Zimbabwean immigrants to derive an alternative estimate for the net number of Zimbabwean migrants. Furthermore, we compare our estimates with the estimates implied from other data sources.

3 METHODS

This section consists of three parts, the first section examines the data sources. The second section describes the estimation of the net number of Zimbabwean migrants using census data. The third section explores alternative estimates to the net number of Zimbabwean migrants and several adjustments made where necessary to improve the plausibility of the estimates.

3.1 Data sources

3.1.1 Census data

The reference date for the Zimbabwean censuses is mid-night 17th/18th of August 1992, 2002 and 2012. The numbers by age group and sex for the Zimbabwean population in 1992, 2002 and the 2012 censuses were obtained from the Population Censuses datasets by the Department of Economic and Social Affairs (United Nations 2014b). The population with age “not specified” was redistributed proportionally to the age groups 20 and older on the assumption that age is most likely to be known for children. In this research, no adjustments were made to Zimbabwean census data, it was used as it is.

3.1.1.1 Population age distributions

The proportions of the Zimbabwean census population by age and sex are presented in Figure 3.1 and the intercensal growth rates are shown in Figure 3.2. It can be seen from Figure 3.1 that the proportion for the age group 0-4 years in the 1992 census is lower than the 5-9 years in the same census, suggesting an undercount in the 0-4 years age group. This could be due to age misspecification in the children aged 0-4 years captured being in the 5-9 years age group. Comparing the under-five proportions in the 2002 and 2012 censuses, the proportion in the 2012 census is higher than that of the 2002 census this suggests an overcount in the under-five population in the 2012 census. The 2012 census shows a levelling off in the population ages 5-14, this could be due to age misspecification resulting in the children aged 5-9 being shifted into the 0-4 and 10-14 ages, resulting in the lower enumerated population aged 5-9 years. Also, from Figure 3.2, the growth rate for the females aged 15-49 age group for the period 2002-2012 does not suggest an increase in the childbearing age groups. Figure 3.2, a notable decrease in the growth rates for both intercensal periods can be observed for both males and females in the economically active age groups, starting at the age group 10-14 for males and 20-24

for females. This probably is the result of an increase in outmigration in the two periods.

Figure 3.1: Proportions of the Zimbabwean census population by age and sex

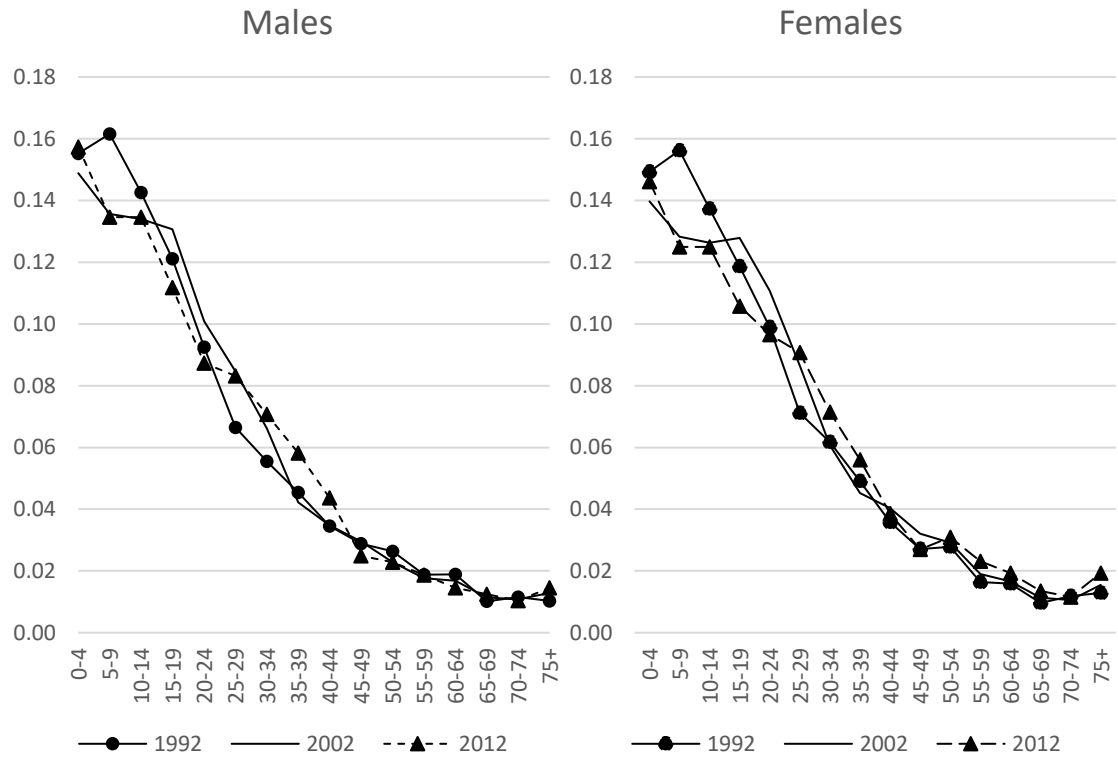
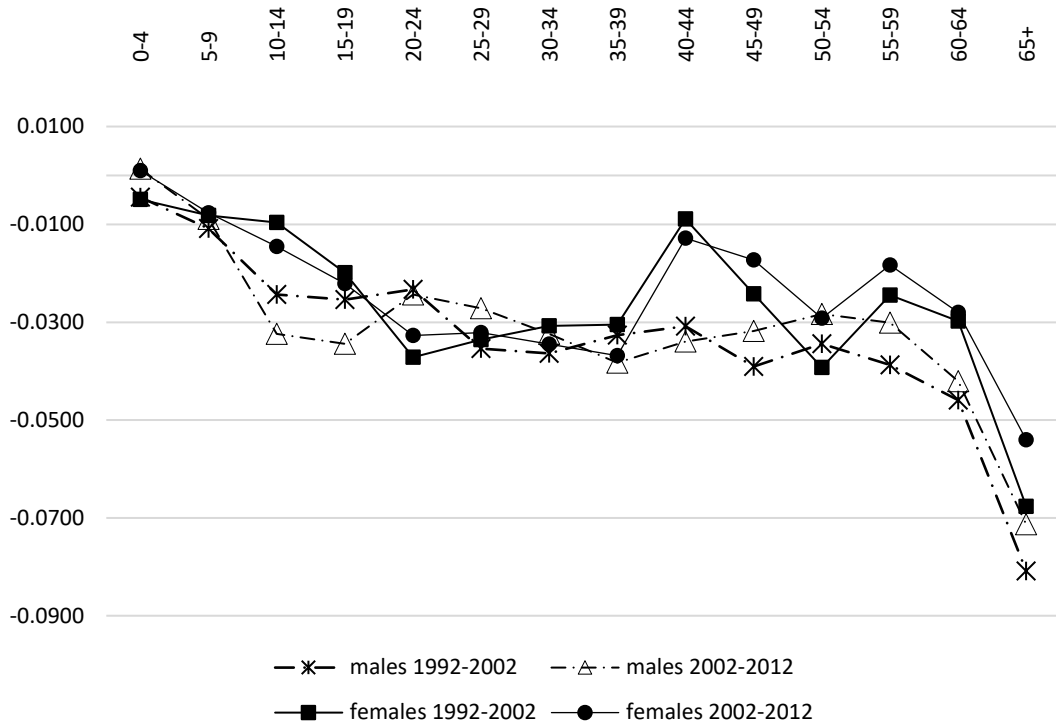


Figure 3.2: Growth rates for the Zimbabwean census population by age group and sex



3.1.2 Birth and death data

Data on the intercensal deaths and births in Zimbabwe are not publicly available from the Zimbabwean National Statistics Agency, so fertility rates and mortality rates estimates from the World Population Prospects (United Nations 2017c)² had to be used to derive births and deaths estimates for the period of interest.

Zimbabwean lifetables for the period 1990-2015 obtained from the World Population Prospects³ are used to derive survival ratios for the intercensal period. This is done by using the tabulated person-years lived between age x and $x+n$, ${}_nL_x$ from the life tables, and the survival ratio for those aged x is given by the equation below,

$${}_nS_x = {}_nL_{x+5} / {}_nL_x .$$

To estimate births for the two intercensal periods, age-specific fertility rates obtained from the World Population Prospects (United Nations 2017c) were applied to the females in the childbearing age groups that are 15-49 years. That is, to estimate the number of births in the first intercensal period, age-specific fertility rates were applied to

² <https://esa.un.org/unpd/wpp/Download/Standard/Population/>

³ World Population Prospects 2017. <https://esa.un.org/unpd/wpp/Download/Standard/Mortality/>

the females in the age groups 15-49 years and multiplied by five. Census data for the years 1992, 2002 and 2012 by five-year age groups and sex obtained from Statistics Division (United Nations 2014b) are used. We also used sex ratios obtained from World Population Prospects (United Nations 2017c) workbooks.

3.2 Estimating net migration using Hill and Wong's approach

The Hill and Wong (2005) variation of the residual method, was applied to the Zimbabwean census data for males and females separately, to estimate the intercensal net migration (or emigration on assumption that the bulk of the population counted in the census were born in Zimbabwe) for 1992- 2002 and 2002-2012. In this research, to estimate the net migration between the two successive censuses used the equation below;

$${}_5NM_x = {}_5N2_x - {}_5N1_x - B_x + B_{x+5} + {}_5D_x$$

The 1992 and the 2002 census populations estimates by five-year age groups were used as the starting population (${}_5N1_x$) for the first and second intercensal periods respectively, and the 2002 and 2012 census populations were used as the closing population (${}_5N2_x$). Estimates of deaths for the intercensal period were derived by applying survival ratios to the population to the first census (${}_5N1_x$). To estimate age-specific survival ratios for the intercensal period, Zimbabwean lifetables obtained from the World Population Prospects (United Nations 2017c) were used. We assumed that this approximation cannot be applied for the first age group, so we estimated births for the first age-specific fertility rates obtained from the World Population Prospects (United Nations 2017c), were applied to the female population in the childbearing age groups. The sex ratio at birth for the period 1992 to 2012 is 102 according to the World Population Prospects (United Nations 2017c).

The number who turn x in the intercensal period, B_x , is estimated from the age distribution of the census, five-year age groups and the censuses are ten years apart. The approximation cannot be performed for the first age group, in this research the number of births in the intercensal period are used. The approximation also does not work in the last age group, (Hill and Wong 2005). Since it is not possible to estimate B_{75} if the open interval is 75+ the open interval for migration is 70+ and net migration for the open interval is estimated using the equation below;

$$NM_{70+} = N2_{75+} + {}_5N2_{70} - N1_{75+} - {}_5N1_{70} + B_{70} + {}_5D_{70} + D_{75+}$$

3.3 Alternative estimates

3.3.1 Migration estimates from the Zimstat

According to Zimstat (2015a, 2015b), an estimated 558,303 persons migrated in the intercensal period between the 2002 and 2012 censuses. They used the balancing equation to estimate net migration, which stipulates that the difference in total population between two census dates is a combined result of births, deaths and net migration. They used census data for the years 2002 and 2012, and the estimated mortality was from data collected in censuses and surveys since the civil registration system was unreliable. However, they did not indicate how they dealt with differentials in the completeness of the census data. They referenced a Migration Thematic Report for more details about the method they used, but the report is not available on their website and appears never to have been published.

3.3.2 Estimating the net number of Zimbabwean migrants using WPP annual data

Another set of estimates were derived from the WPP (United Nations 2017d) default data in Spectrum Version 5. Spectrum consists of several software models, which seek to provide policymakers with an analytical tool to support decision making. In this research, we used the AIM (Aids Impact model) and the DemProj module. The AIM model projects the consequences of the HIV epidemic, including the number of people living with HIV, new infections, and AIDS deaths by age and sex. The DemProj model projects the population annually for an entire country or region by age and sex, based on assumptions about fertility, mortality, migration and it uses the World Population Prospects 2017 Revision for non-HIV demographic components.

In this research, using 1992 as the base year, the default model in Spectrum was used to project the population of Zimbabwe from 1992 to 2013 and the AIM module was applied to allow for the effect of HIV and AIDS in our projection. It should be noted that the default projection in Spectrum uses non-HIV demographic assumptions from WPP, but it does not provide numbers of migrants by individual age last birthday per year. Thus, two separate projections were done, one which included migration from Spectrum and one with migration assumed to be equal to zero in all age groups. Using the DemProj module in Spectrum, single-year population projections by age and sex were produced for the two projections.

The cohort-component approach was then used to estimate net migration by age and sex. Using the projection with zero migration, yearly survival ratios were calculated as a ratio of the population without migration aged $x+1$ in the year t over the population without migration aged x in the year $t-1$. These survival ratios are then applied to the yearly populations from the projection that included migration and using the same approach as in the demographic balance equation, the net number of yearly migrants were estimated at each age. To estimate the total net number of migrants by age when they migrated, the single-year net number of migrants were summed using age at migration, such that all those aged x are grouped together over the years. An adjustment is made to the first year and the last year to allow for the census dates, on the assumption that the migrants are uniformly distributed over the year. The net number of migrants estimated by single age are then grouped into five-year age groups.

3.3.3 Estimating migration using the Global Burden of Disease data

Another set of migration estimates were derived using estimates from the Institute for Health Metrics and Evaluation (2018). The IHME publishes estimates for the population by single calendar year from 1950-2017, fertility and the deaths for all the countries. Using the Institute for Health Metrics and Evaluation (2018) estimates of the population (for the year 1992, 1997, 2002, 2007, and 2012), the deaths, and the births, net migration was estimated for the intercensal period using the Hill and Wong (2005) approach.

3.3.4 Estimating the net number of Zimbabwean migrants to major receiving countries using census data of these countries

In this subsection, we estimate the net number of Zimbabwean migrants using census data from South Africa and the UK obtained from the IPUMS-INTERNATIONAL (2018). Using these estimates from the major receiving countries, we estimated the number of the total net number of Zimbabwean migrants living outside of Zimbabwe. However due to the complex nature of the Zimbabwean migration, we could not ascertain the level of registration for these censuses.

3.3.4.1 Estimating the net number of Zimbabwean migrants from South African census data

To estimate the net migration of Zimbabweans to South Africa, census data from the years 1996, 2001 and 2011 are used. Tabulations of the Zimbabwean-born population by age and sex from each census are obtained from the South African census datasets from IPUMS-INTERNATIONAL (2018) using STATA.

According to Carballo and Nerukar (2001), migrants who move because of poverty arrive with the same health profiles which are the same as those in their previous surroundings. The major push factor for most Zimbabwean immigrants in South Africa is the economic downfall in Zimbabwe. To estimate the intercensal mortality experienced by the Zimbabweans in South Africa, in this research we assume it is the same as in Zimbabwe and hence we used life tables from World Population Prospects (United Nations 2017c) to derive the intercensal survival ratios.

Thus, to estimate the net number of surviving migrants by sex between 1996 and 2001, survival ratios are applied to the numbers of Zimbabwean migrants from the 1996 South African census data assuming that these numbers were reasonably enumerated and subtracted from the number of Zimbabwean migrants from the 2001 census data, using the equation below:

$${}_5 NetM'_{x+n} = {}_5 P_{x+n}^2 - ({}_n S_x \times {}_5 P_x^1),$$

where ${}_5 NetM'_{x+n}$ is the net number of surviving immigrants at the end of the intercensal period, ${}_5 P_x^1$ and ${}_5 P_{x+n}^2$ are the enumerated Zimbabwean born population in South Africa aged x to $x+4$ last birthday at the time of the first census and $x+n$ to $x+(n+4)$ last birthday at the second census respectively, and n is the time between the two censuses. ${}_n S_x$ is the intercensal survival ratio for migrants aged between x and $x+5$ at the first census, it is derived from life tables from the World Population Prospects (United Nations 2017c).

However, this approach tends to underestimate the number of migrants since it does not take into consideration the number of migrants who died during the intercensal period. Hence, to estimate the net number of migrants in the intercensal period one needs to average the net number of migrants alive at the end of the period and the number alive at the start of the period who migrated in the period. Thus, the net number of migrants in the period is given by the equation below;

$${}_5 Net \bar{M}_{x+n} = (1 + {}_5 S_{x+n} / 2 {}_5 S_{x+n}) \times {}_5 Net M'_{x+n}.$$

This approach is applied to both intercensal periods to estimate the net number of migrants by age and sex of Zimbabweans in South African.

3.3.4.2 *Estimating the net number of Zimbabwean migrants from UK census data*

To estimate the net number of Zimbabwean migrants into the UK, this research uses data from the national censuses conducted in 1991, 2001 and 2011 in the UK obtained from IPUMS-INTERNATIONAL (2018) and tabulations of the numbers of Zimbabweans counted in the UK censuses provided by the UK central statistics office⁴. The 2011 African born census data are provided by sex in five-year age groups, but the 2001 census data are given in broader age groups by sex, namely, 0-15, 16-64 and 65+. However, for the 1991 census only totals by sex are available.

Due to the unavailability of data in five-year age bands for all censuses, the migration has to be estimated in broader age groups then apportioned into five-year age groups. In this research, in the absence of better information, it was necessary to assume that these proportions of the broader age groups are the same as those for all Africans in the UK (for which there are data) and that the proportions are the same for each of the two intercensal periods. Thus, five-yearly age group proportions derived from estimates of African migrants in the UK for the first intercensal period were used to apportion the broad age group estimates of the net number of Zimbabwean migrants in the second intercensal period.

According to Dov (2016), migrants who belong to higher socio-economic groups tend to have lower mortality than the population in their country of origin. We would expect the Zimbabwean migrants to have slightly higher mortality than the UK population, but for it to be significantly lighter than the Zimbabweans living in Zimbabwe mainly due to access to better health services in the UK compared to Zimbabwe. In this research, due to the unavailability of mortality estimates the intercensal period experienced by the Zimbabweans in the UK, we assume that the mortality is the same as that of the white South African population for 1984-1986 as measured by the white South African life Tables for the period 1984-1986⁵.

Survival ratios for the two intercensal periods are derived from these life tables and we assume that the mortality is constant over the whole of intercensal periods. For the first intercensal period, 1991-2001, the estimate of the survival ratio is obtained by dividing the sum of person-years lived for those that reach ten years and older by the sum of person-years lived from age zero and older. For the second intercensal period,

⁴ Office for National Statistics (ONS), Census.CustomerServices@ons.gsi.gov.uk

⁵ <http://robertjkoch.com/document-library?folder=General%252FLife%2BTables>

ten-year survival ratios are estimated, for the age group 0-15 years, 16-64 years and 65+ years on the assumption that the person-years lived in an age group is the same for all the five ages. For the 0-15 age band, we had to add person-years lived in the 0-14 age group plus one-fifth of the person-years lived in the 15-19 age group, the same figure was subtracted when calculating the person-years lived in the age group 16-64 years.

Assuming that the censuses are accurate, and that the degree of enumeration is similar for both the censuses, net migration for the intercensal period is estimated by projecting the population in the first census, ${}_n P_x^1$, forward using survival ratios, ${}_n S_x$. The residual difference between the enumerated population in the second census, ${}_n P_x^2$, and the projected population is the estimate for the net number of surviving migrants for the intercensal period. To estimate the number of migrants that were alive at the beginning of the period, the later population is projected back to the date of the first census. The two cohort estimates of intercensal migration are then converted to an average estimate of the net number of migrants for the intercensal period.

Using the place of birth variable in the UK census data set for 1991 and 2001, the number of African migrants in five-year age groups are obtained. The mortality of Africans in the UK is assumed to be the same as Zimbabweans in the UK, hence the SALTs for the white population group for the period 1984-1986 were used. The coverage of censuses is assumed to be the same, and net migration estimates in five-year age groups were computed using the same approach above. An estimate of the average of the net number of male and female African migrants in each age group was computed. Proportions of these migrants in five-year age groups are used to redistribute the broader age bands from the estimates of the Zimbabwean migrants in the second intercensal period.

To distribute the total number of migrants in the first intercensal period, it was assumed that the migration pattern is the same as that of the second intercensal period. Thus, the total number of migrants in the first period were distributed according to the proportions by age of the second intercensal period.

3.3.4.3 Estimating the number of all Zimbabwean migrants from DESA data

To estimate the net number of Zimbabwean migrants to all African countries and the rest of the world, in this research data from the Department of Economic and Social Affairs (United Nations 2017e) is used to get numbers of migration stock over the period. The data is provided in tables of the numbers of migrants as in the middle of

each year by country of destination and country of origin in five-year intervals from 1990 to 2017. First, we estimate the numbers of Zimbabwean migrants to African countries and then estimate the numbers of Zimbabwean migrants to countries outside Africa and sum the two to get a total of the net number of Zimbabwean migrants.

In this research, we assume the Zimbabwean migrants in Africa have the same mortality and same age distribution as the migrants in South Africa. First, the stock figures are adjusted to match our intercensal period, this was done by interpolation on the assumption that the population growth has a linear relationship with the years.

To obtain the mortality for the two periods 1992-2002 and 2002-2012, we assumed that the mortality is the same as the population in Zimbabwe and hence we used life tables from World Population Prospects (United Nations 2017c). Mortality estimates for the total population were obtained by dividing T_{10} which represents the number of survivors in the age group 10 years and older, by T_0 which represents the number of survivors in the age zero and older. The net number of Zimbabwean migrants by sex was estimated by applying the same approach as in estimating the net number of Zimbabwean migrants in the UK for the first intercensal period. The estimates for the net number of Zimbabwean migrants to African countries are then distributed using the same age group proportions of the net number of Zimbabwean migrants derived using the South African census data. Thus, we will assume the age proportions for the net number of Zimbabwean migrants to Africa between 1992 to 2002 is the same as the age proportions of the net number of migrants derived from the 1996 and 2001 South African census. Also, the net number of Zimbabwean migrants to African countries for the period 2002 to 2012 are redistributed using the age proportions of the net number of Zimbabwean migrants to South Africa in the period 2001 to 2011.

To estimate the number of Zimbabwean migrants to countries outside Africa for the period of interest, the stock figures obtained from the Department of Economic and Social Affairs (United Nations 2017e) were used. To estimate the total number of Zimbabwean migrants as at the census dates, the same approach used to estimate the total number of Zimbabwean migrants by sex to African countries was used.

The mortality for the period was assumed to be the same as the white South African population as measured by the South African white Life Tables for the period 1984-1986. Survival ratios for the two intercensal periods are derived from these life tables and we assume that the mortality is constant over the whole of intercensal

periods. The estimate of the survival ratio is obtained by dividing the sum of person-years lived for those that reach ten years and older by the sum of person-years lived from age zero and older. Applying these survival ratios to our population estimates using the balancing equation approach, net migration is estimated. In this research, we assumed that the Zimbabwean migrants to countries outside Africa will have the same age distribution as the Zimbabwean migrants in the UK, hence the numbers of Zimbabwean migrants to countries outside Africa are distributed by age group using proportions from the estimates of Zimbabweans living in the UK obtained in the section above.

Using these two estimates, the net number of Zimbabwean migrants to African countries and the net number of Zimbabwean migrants to countries outside of Africa, estimates for the total net numbers of Zimbabwean migrants are being produced by adding the two.

This chapter presents the results of the methods described in Chapter 3, it is divided into three sections, the first sections present the estimates derived using the census data, the second section presents alternative estimates using different data sources and methods. The final section of this chapter presents the comparisons of the different estimates.

4.1 Estimates of net migration from the Zimbabwean census

Tables A. 1- A. 4 in Appendix A show the application of the Hill and Wong (2005) approach to the 1992, 2002 and 2012 Zimbabwean censuses for males and females separately. For the two intercensal periods, the numbers for births and deaths were obtained from the estimates by the World Population Prospects (United Nations 2017c).

Table 4.1 shows the estimates of the net number of Zimbabwean migrants by age group and sex for the two intercensal periods, and Figure 4.1 and Figure 4.2 show the summary of the estimates. Table 4.1 indicates a net total of -1,243,059 migrants between the 1992 and the 2002 censuses, of which -649,256 were males and -593,804 were females. For the period between 2002 and 2012 censuses, there was a net total of -1,307,821 migrants of which -742,614 were males and -565,207 were females.

However, an inspection of Table 4.1 reveals that for both males and females, half of the total net out-migration is made up of children in the age group 0-4, which is highly implausible. The high net immigration in the age group 5-9 for both males and females in both intercensal periods is also highly implausible. These distortions are probably mainly due to undercounting of the 0-4 year olds in the censuses, a common error in developing countries (Moultrie, Dorrington, Hill *et al.* 2013). For the 0-4 age range, the 0-4 numbers in the second census are undercounted relative to the estimate of births in the intercensal period. For the 5-9 age range the 0-4 numbers in the first census are undercounted relative to the survivors in the second census.

Alternatively, it is possible that there is also an underestimation of the mortality in the 0-4 age group and an overestimation of the mortality in the 5-9 age groups.

According to Quattrochi, Salomon, Hill *et al.* (2019), indirect estimates of under-five mortality can be significantly biased in populations largely affected by HIV/AIDS. They note that these methods use survey information collected from mothers on the

number of live-born children they have ever given birth to and the number that are still alive and no information is taken on the dates of births and deaths. They argue that time trends in the under-five mortality need to be gradual and unidirectional, as the incidence of HIV/AIDS has changed over time due to the availability of antiretroviral therapy (ART). They also argue that there is correlation between the mother's survival and that of her children due to the nature of the disease. Hence if the number of women who have died are under-represented in the survey sample it might result in a direct bias in the under-five mortality.

Finally, it is possible that the number of births was overestimated relative to the population estimates. We will discuss alternative estimates for the two age groups later.

At the older age group 70+, for both periods the estimates suggest a net gain in migration, which is unlikely as we would expect to have less migration at this age group, and this is probably due to age exaggeration.

Table 4.1: Net migration estimates for the two intercensal periods from Zimbabwe using census data

	1992-2002			2002-2012		
	Males	Females	Total	Males	Females	Total
0-4	-265,974	-238,694	-504,668	-411,633	-373,989	-785,622
5-9	3,239	-5,171	-1,932	58,398	49,567	107,965
10-14	-68,776	-51,718	-120,494	-42,912	-36,611	-79,523
15-19	-143,843	-55,693	-199,536	-203,557	-90,485	-294,043
20-24	-111,923	-91,211	-203,134	-174,931	-126,485	-301,416
25-29	-49,906	-114,017	-163,923	-76,864	-127,870	-204,734
30-34	-33,146	-43,427	-76,573	-32,064	-36,884	-68,947
35-39	-10,397	-20,464	-30,861	12,645	15,024	27,670
40-44	9,133	-10,448	-1,315	28,627	12,468	41,095
45-49	7,758	23,737	31,495	20,067	46,969	67,037
50-54	-5,736	-507	-6,243	19,862	28,705	48,567
55-59	-1,716	-20,441	-22,157	12,810	-459	12,351
60-64	-4,743	3,248	-1,495	4,956	14,074	19,030
65-69	-3,972	-1,761	-5,733	164	3,660	3,823
70+	30,746	32,763	63,509	41,818	57,109	98,927
Total 10-70+	-386,521	-349,939	-736,460	-389,380	-240,785	-630,165
Total	-649,256	-593,804	-1,243,059	-742,614	-565,207	-1,307,821

Figure 4.1: Estimates for the net number of migrants for the intercensal period (1992-2002) for Zimbabweans

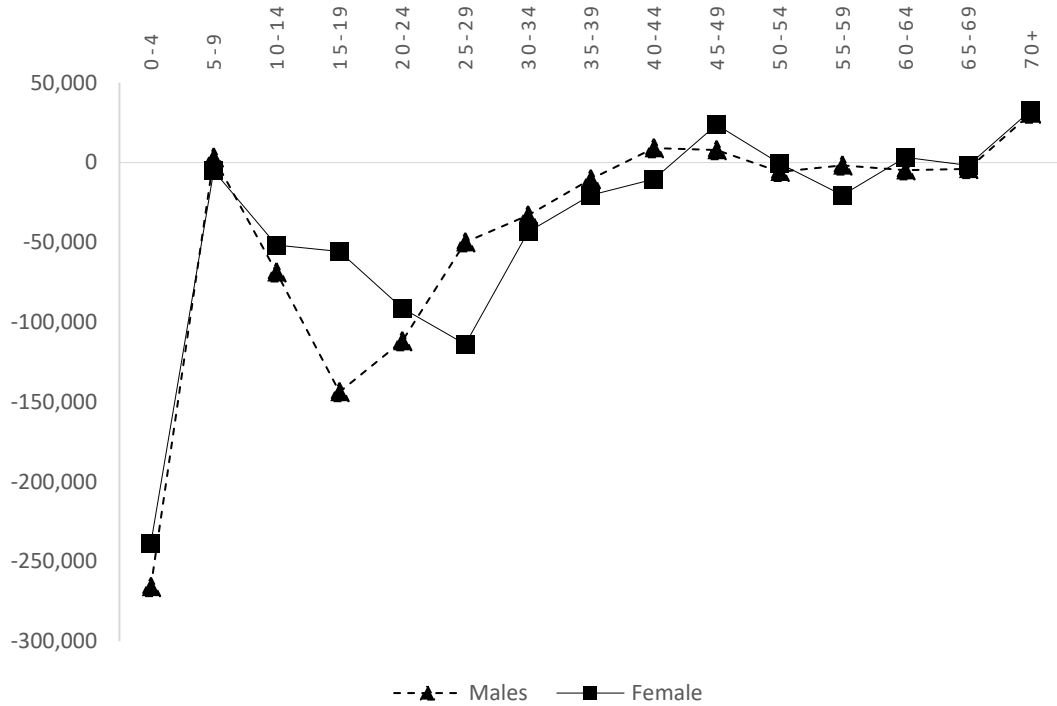


Figure 4.2: Estimates for the net number of migrants for the intercensal period (2002-2012) for Zimbabweans

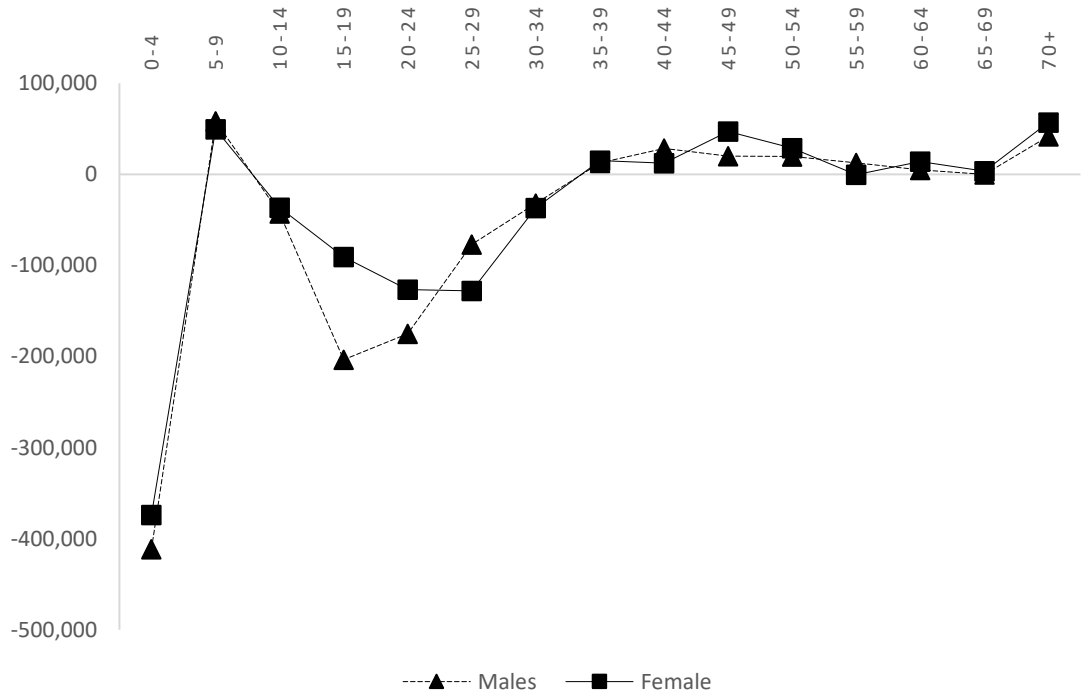


Figure 4.1: and Figure 4.2 above both suggest peaks in the economically active age groups, which is similar to the migration schedule by Castro and Rogers (1983)

however, peaks are observed at younger ages. It worth noting from the observation that there are high in male migrants than female migrants. In both intercensal periods, troughs are observed at the age group 15-19 years for the male migrants and interestingly they occur at a later age group for female migrants in the age group 25-29 years. It can also be observed for both males and females that more than half of the total net emigration is concentrated in the age range 10-29 years. There also appears to be some evidence of return migration in the age groups 30+ for the first intercensal period and in the age groups 40+ for the second intercensal period, more so for males.

4.2 Alternative estimates

To evaluate the estimates, we derived from the Zimbabwean census we used other approaches and alternative data sources to derive estimates of the net number of Zimbabwean migrants. This section presents the alternative estimates of the net number of Zimbabwean migrants during the two intercensal periods 1992-2002 and 2002-2012.

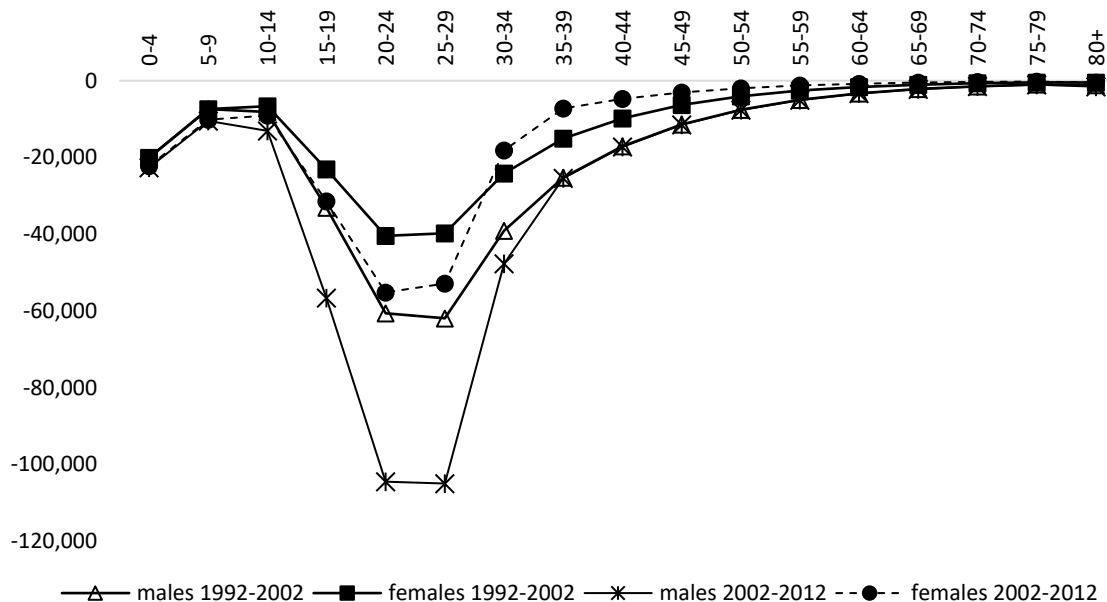
4.2.1 Estimating net migration from WPP annual estimates

The results of estimating the net number of Zimbabwean migrants by age and sex over the two intercensal periods using data in Spectrum from the WPP (United Nations 2017c) are shown in Table 4.2 and Figure 4.3 below. The first thing to notice is that migration increased in the second intercensal period and that more males migrate than females. Second, for both intercensal periods, migration is concentrated in the economically active age groups and much higher for males. However, it is worth noting that the estimates have troughs at older age groups compared to the estimates derived using the Zimbabwean censuses. At the older ages, the figures are close to zero which is broadly consistent with estimates from the Zimbabwean censuses.

Table 4.2: Estimates of the net number of Zimbabwean migrants from Zimbabwe

	1992-2002			2002-2012		
	Males	Females	Total	Males	Females	Total
0-4	-20,065	-20,098	-40,163	-22,670	-22,257	-44,927
5-9	-7,412	-7,435	-14,848	-10,500	-10,116	-20,616
10-14	-8,142	-6,635	-14,778	-13,103	-9,062	-22,165
15-19	-33,072	-23,079	-56,151	-56,625	-31,457	-88,082
20-24	-60,627	-40,428	-101,055	-104,453	-55,161	-159,614
25-29	-61,907	-39,766	-101,673	-104,962	-52,890	-157,852
30-34	-39,102	-24,205	-63,306	-47,715	-18,183	-65,897
35-39	-25,258	-15,059	-40,317	-25,438	-7,230	-32,668
40-44	-17,102	-9,843	-26,945	-17,237	-4,745	-21,982
45-49	-11,417	-6,333	-17,750	-11,531	-3,095	-14,626
50-54	-7,563	-4,039	-11,602	-7,641	-1,988	-9,628
55-59	-5,004	-2,581	-7,584	-5,037	-1,257	-6,294
60-64	-3,305	-1,636	-4,941	-3,321	-799	-4,119
65-69	-2,182	-1,040	-3,223	-2,196	-500	-2,696
70-74	-1,446	-663	-2,109	-1,456	-322	-1,778
75-79	-1,000	-445	-1,445	-1,054	-241	-1,295
80+	-1,141	-490	-1,632	-1,531	-480	-2,011
Total 10-70+	-278,268	-176,243	-454,512	-403,301	-187,408	-590,709
Total	-305,746	-203,776	-509,523	-436,471	-219,781	-656,252

Figure 4.3: Estimates of the net number of Zimbabwean migrants from Zimbabwe



4.2.2 Estimating migration using the Institute for Health and Evaluation data

The net number of Zimbabwean migrants were also estimated by applying the Hill and Wong (2005) approach to the data from Institute for Health Metrics and Evaluation

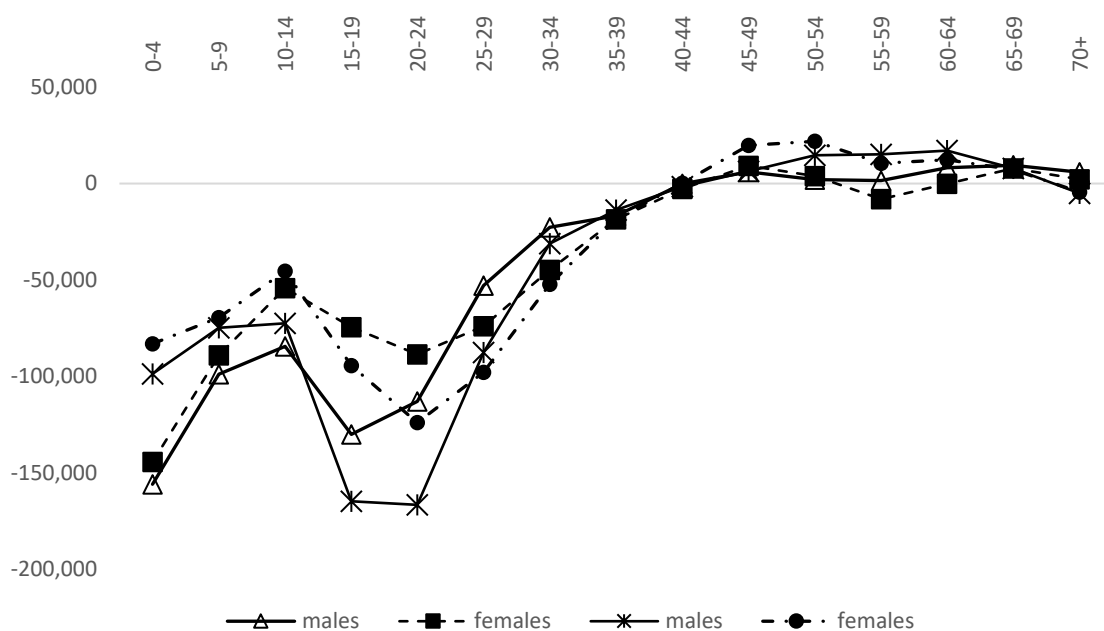
(2018), the results are presented in Table 4.3 and Figure 4.4 below. From observation, it can be noted in contrast to the previous estimate that the net number of Zimbabwean migrants decreased slightly for both sexes from the first to the second intercensal period. However, implausible numbers are observed in the age groups 0-4 and 5-9 years for both intercensal periods as we would expect the number of migrants in these age groups not to exceed that of females in the childbearing ages. This can be explained by two possible errors. First, the IHME model overestimating the fertility in the intercensal period and thus producing births that are more than expected given the population estimates. Second, the IHME model underestimating the mortality for the population under ten for both intercensal periods. Third, data error in the Zimbabwean census population estimates in these child age-groups, which appear to have been used without correction.

From Figure 4.4, the net migration estimates implied by the IHME data again suggest that for both intercensal periods the net migration is concentrated in the economically active age groups, with more male migrants than female migrants. Troughs are observed in the age group 15-19 years for males in both intercensal periods. For the female, the troughs are observed in the age group 20-24 years in the second intercensal period and the age group 25-29 years in the first intercensal period. Less emigration can be observed in the older age groups, as we would expect less migration in the old ages. In the last age group, 70+ net migration is close to zero.

Table 4.3: Net number of Zimbabwean migrants for the period 1992-2012, using IHME data

	1992-2002			2002-2012			Total net number of migrants
	males	females	Total	males	females	Total	
0-4	-155,879	-144,365	-300,245	-98,654	-83,028	-181,682	-481,927
5-9	-98,747	-89,022	-187,769	-74,758	-69,440	-144,197	-331,966
10-14	-84,420	-54,137	-138,557	-72,417	-45,410	-117,827	-256,384
15-19	-129,989	-74,358	-204,347	-164,666	-94,269	-258,935	-463,282
20-24	-112,994	-88,498	-201,492	-166,552	-123,936	-290,488	-491,980
25-29	-52,873	-73,919	-126,792	-87,575	-97,859	-185,434	-312,226
30-34	-22,633	-44,663	-67,296	-31,206	-52,200	-83,406	-150,702
35-39	-16,638	-18,495	-35,133	-13,762	-18,582	-32,344	-67,477
40-44	-125	-2,729	-2,854	-1,591	156	-1,435	-4,289
45-49	5,978	9,237	15,215	6,311	19,817	26,128	41,343
50-54	2,071	3,813	5,884	14,704	21,896	36,600	42,484
55-59	1,633	-8,038	-6,406	15,159	10,458	25,617	19,211
60-64	8,191	-141	8,051	17,076	12,349	29,426	37,476
65-69	9,466	7,875	17,340	7,839	7,194	15,034	32,374
70+	5,873	2,156	8,030	-5,025	-4,397	-9,422	-1,392
Total 10-70+	-386,460	-341,896	-728,356	-481,706	-364,781	-846,487	-1,574,843
Total	-641,086	-575,283	-1,216,369	-655,118	-517,249	-1,172,366	-2,388,736

Figure 4.4: Net number of Zimbabwean migrants for the two intercensal periods



4.2.3 Estimates of the net number of Zimbabweans migrating to major receiving countries

4.2.3.1 *Estimates of net migration from the South African census data*

The results of estimating the net migration of the Zimbabwean-born population in South Africa are presented in Table 4.4. It can be noted from these results that the net number of Zimbabwean migrants at the end of the first intercensal period 1996-2001 was 63,077, of which 36,967 were males and 26,110 were females. It can also be noted that in the second intercensal period 2001-2011, the net number of Zimbabwean migrants alive at the end of the period was 611,054, of which 348,739 are males and 262,315 were females. It can be observed that for both intercensal periods the net number of male Zimbabwean migrants is more than the net number of female Zimbabwean migrants, and the major differences between the two sexes were in the economically active age groups. However, it should be noted that these results are offset by a year with reference to our period of interest, as the first intercensal period ends in 2001 and the second intercensal period ends in the year 2011.

Figure 4.5 summarises the net number of migrants in the first intercensal period at the age at which they migrated, that is we assumed the migrants moved midway between the two censuses and thus they were 2.5 years younger from the age at the end of the period. It can be observed that migration is concentrated between the ages 15 and 40 for both sexes, both sexes having a peak at the age group 20-24 years. At the older ages, a drop in net migration is an indication of less movement in these old age groups.

Figure 4.6 shows the net number of Zimbabwean migrants in the second intercensal period at the age when they migrated, and we assumed they migrated halfway through the intercensal period aged five years younger. It can be observed that the number of male migrants is slightly more than the number of female migrants, but for both sexes, the net number of migrants is concentrated in the economically active age groups with peaks observed for both sexes in the age group 20-24 years. Migration at the older ages is close to zero, as might be expected with less movement these older age groups.

From the observation of the two intercensal periods, on average migration of Zimbabweans into South Africa drastically increased in the second intercensal period. This is largely due to Zimbabwean's economic downward trend and political unrest. It can be noted that the proportions of female migrants in the second intercensal period increased compared to the first intercensal period. In the younger age groups, it can be

noted that the 0-4 age group is slightly higher than the 5-9 age group, this might be due to the mother moving with their small children as they still require care. For both intercensal periods, the migration is concentrated in the economically active age groups. A point worth noting is that the peak age groups are observed at a later age group for males and an earlier age group for females compared to the migration estimates derived from the census data from Zimbabwe for both periods. This might be explained by age misclassification in the net receiving country.

Table 4.4: Net number of Zimbabwean migrants at the end of each intercensal period using South African Census data

	1996-2001			2001-2011			
	males	females	Total	males	females	Total	
0-4	1,065	1,080	2,145	0-4	16,364	16,261	32,625
5-9	307	336	643	5-9	10,838	10,510	21,349
10-14	404	371	775	10-14	6,314	6,084	12,398
15-19	3,341	1,836	5,177	15-19	16,827	13,418	30,245
20-24	7,980	4,806	12,787	20-24	68,202	59,582	127,784
25-29	6,873	3,732	10,605	25-29	92,393	70,042	162,435
30-34	3,697	2,274	5,971	30-34	59,402	37,987	97,390
35-39	3,135	2,545	5,680	35-39	35,354	21,329	56,682
40-44	2,508	2,338	4,846	40-44	20,503	12,036	32,539
45-49	2,122	2,103	4,226	45-49	9,517	7,177	16,694
50-54	1,624	1,646	3,269	50-54	6,308	2,990	9,299
55-59	1,231	1,008	2,239	55-59	3,103	1,434	4,537
60-64	985	303	1,288	60-64	1,495	808	2,303
65-69	708	718	1,426	65-69	127	522	649
70-74	283	185	468	70-74	372	438	810
75-79	190	341	531	75-79	319	429	747
80+	515	486	1,002	80+	1,301	1,267	2,567
TOTAL 10-80+	35,596	24,693	60,289		321,537	235,544	557,081
Total	36,967	26,110	63,077		348,739	262,315	611,054

Figure 4.5: Estimates for the net number of migrants for the intercensal period (1996-2001) at the age when they moved

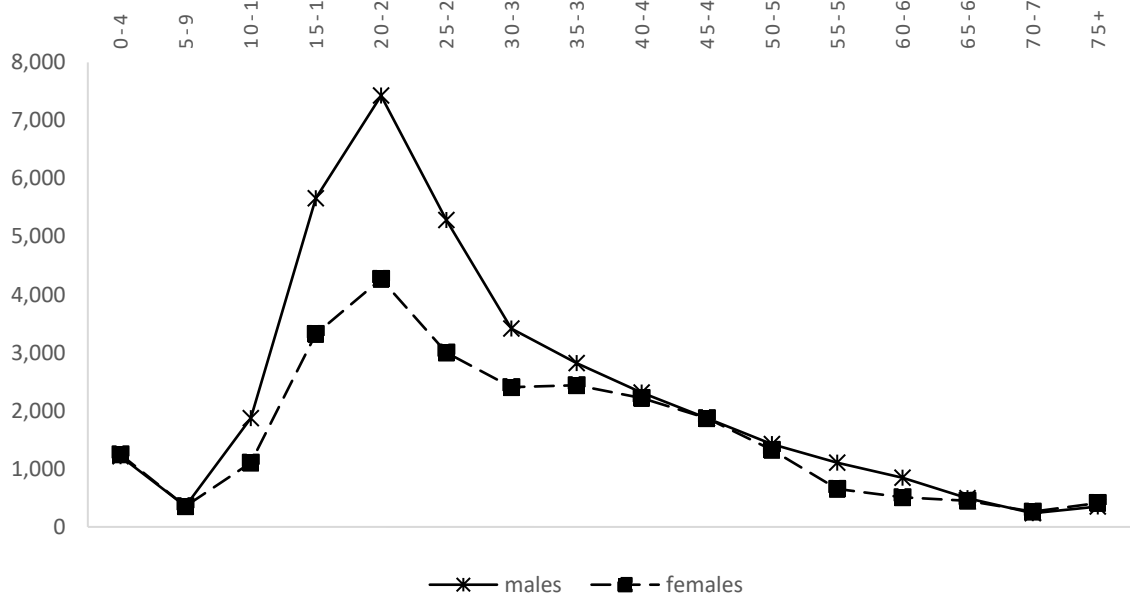
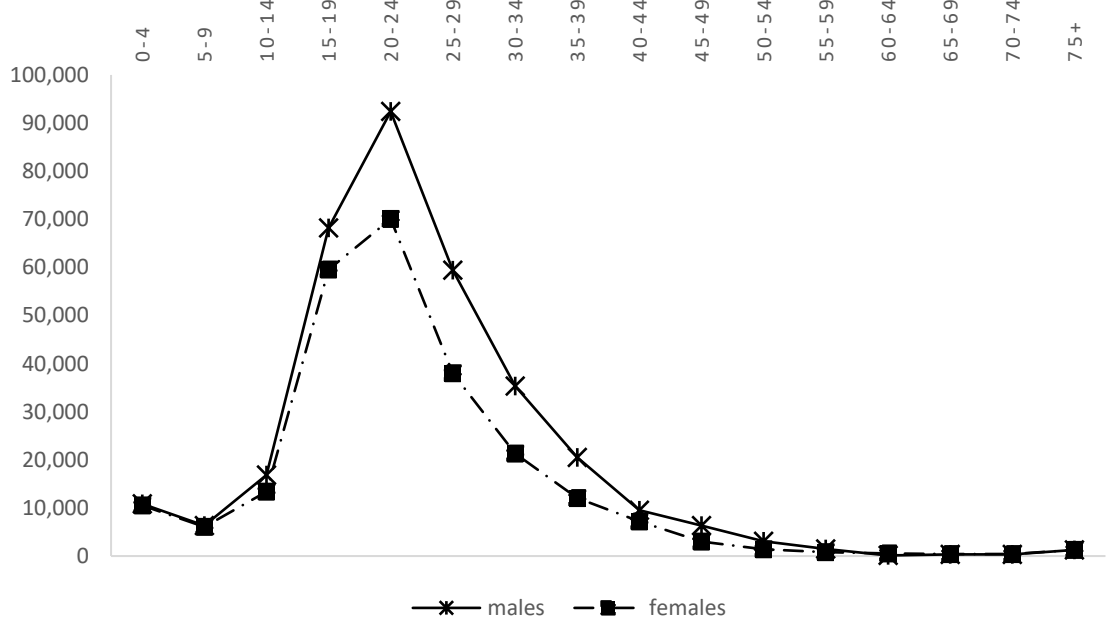


Figure 4.6: Estimates for the net number of migrants for the intercensal period (2001-2011) at the age when they moved



4.2.3.2 Estimates of net migration from the UK census data

The net numbers of Zimbabwean migrants estimated from the census data from the UK are presented in Table 4.5 by age and sex. It can be observed that the net number of migrants is higher in the second intercensal period than the first and that there are slightly more female than male migrants in both periods, which is different from the Zimbabwean migrants to South Africa. The total net number of migrants who survived

to the end of the first intercensal period, 1991-2001, is estimated to be 30,828 (13,852 males and 16,976 females). For the second intercensal period, 2001-2011, it can be noted that the net number of migrants increased to 84,685 (39,795 males and 44,890 females). From observation, it can be noted that migration increased by more than 100 per-cent from the first intercensal period to the second intercensal period.

In this research, due to the unavailability of numbers for Zimbabwean migrants in five-year age groups for the first and second UK censuses, we assumed the Zimbabwean migrants have the same age proportions as the average of the net number of African migrants to the UK for the period 1991-2001. Furthermore, we assumed that the migration pattern is the same for the two intercensal periods. Figure 4.7 below shows the proportions for the net number of African migrants in the UK, for the period between 1991 and the 2001 censuses. We also assumed that the migrants moved into the UK midway through the intercensal period. Figure 4.8 and Figure 4.9 show the net number of Zimbabwean migrants to the UK for the two intercensal periods by age and sex at the age of migration.

Figure 4.7: Age proportions of the average net number of African migrants using UK census (1991-2001) by age at the second census

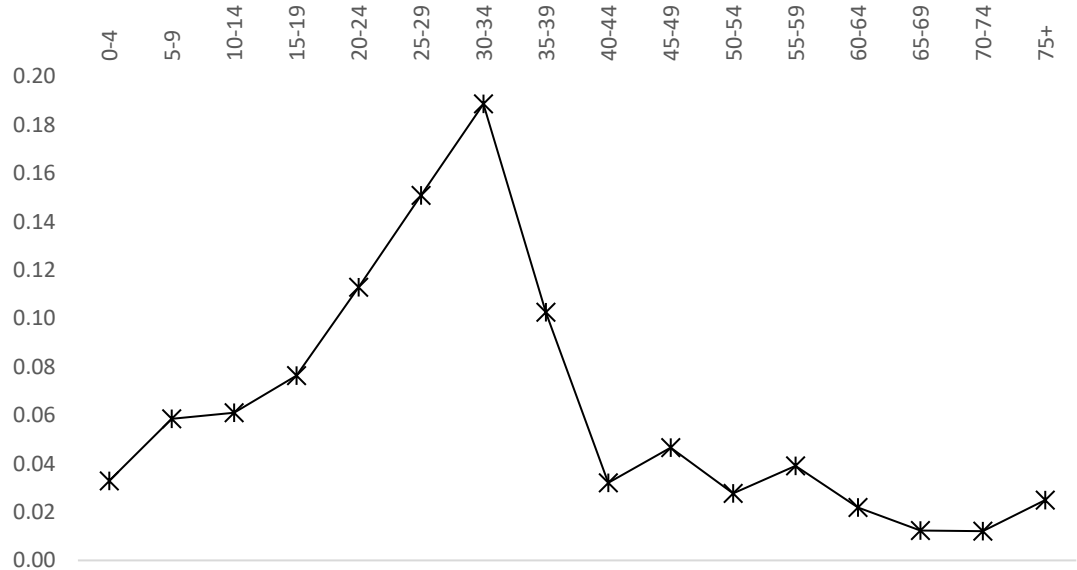


Table 4.5: Net number of Zimbabwean migrants using UK Census data

The net number of migrants by age at the second census

	1991-2001			2001-2011		
	Male	Female	Total	Male	Female	Total
0-4	70	60	130	201	158	359
5-9	388	405	793	1,115	1,071	2,186
10-14	993	1,142	2,136	2,854	3,021	5,875
15-19	1,244	1,431	2,675	3,575	3,783	7,358
20-24	1,840	2,115	3,955	5,285	5,594	10,879
25-29	2,167	2,778	4,946	6,227	7,346	13,573
30-34	2,710	3,474	6,185	7,787	9,187	16,974
35-39	1,473	1,888	3,361	4,232	4,993	9,225
40-44	461	591	1,052	1,324	1,562	2,886
45-49	670	858	1,528	1,924	2,269	4,193
50-54	397	509	906	1,141	1,346	2,487
55-59	562	720	1,282	1,614	1,904	3,519
60-64	314	403	718	903	1,066	1,969
65-69	178	228	405	510	602	1,112
70-74	174	222	396	499	588	1,087
75+	210	151	362	604	400	1,004
Total	13,852	16,976	30,828	39,795	44,890	84,685

Figure 4.8 shows a summary of the annual net number of migrants for the first intercensal period. It can be noted that there are very low numbers in the younger age groups, that is the age group 0-4 years is the lowest and a slight increase in the magnitude as the age groups increase. The low number of children may be due to economically active women migrating without children. From observations, it can be noted that migration is more concentrated between the ages of 10 and 35 years for both sexes and peaks can be observed in the age group 25-29 years old, which is older than migration to South Africa. Again, it can be noted that the migration is concentrated in the economic age groups, as people moved to the UK for employment opportunities. For older ages, migration figures are close to zero, as might be expected if there is less movement in these old age groups. In contrast with migration to South Africa, there is a higher number of female migrants than male migrants in the economic age groups which are probably due to the relative shortage in the UK of certain occupations (such as teachers, nurses, caregivers) for which women are more likely to be qualified.

Figure 4.9 shows the annual net number of migrants for the second period. The shape is similar to that from the first intercensal period, because of the assumption made of similar age proportions. It can be observed that the net migration in the second intercensal period has a higher magnitude than that of the first intercensal period. This increase in the number of migrants in the second intercensal period can probably be explained by the decline in the economy and the political unrest in Zimbabwe.

Figure 4.8: Estimates for the net number of Zimbabwean migrants for the intercensal period (1991-2001) by age when they migrated.

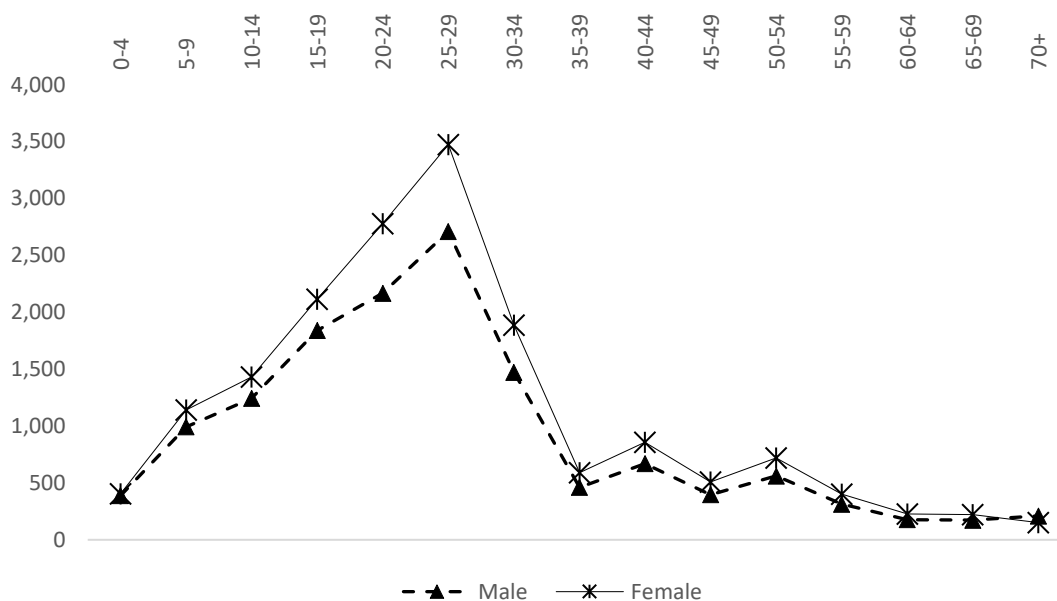
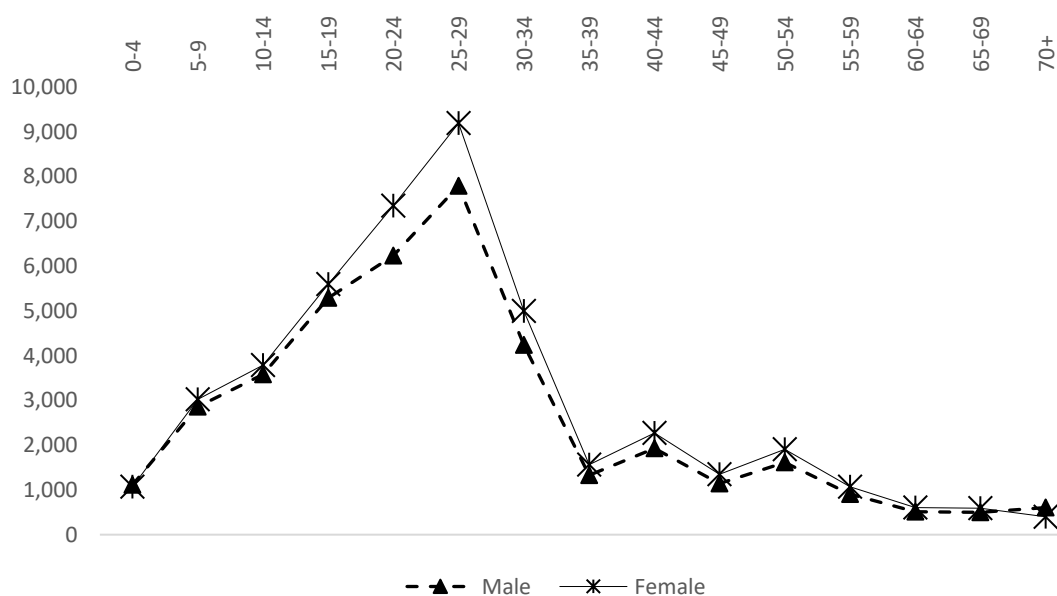


Figure 4.9: Estimates for the annual net number of Zimbabwean migrants for the intercensal period (2001-2011) by age when they migrated.



4.2.3.3 Estimates of the total number of Zimbabwean migrants from DESA data

Presented in Table 4.6 are the migration stock numbers as at the census dates. These were obtained by interpolation of the migration stock numbers from the Department of Economic and Social Affairs (United Nations 2017e) to match the Zimbabwean census dates. From observation, it can be noted that more Zimbabwean migrants are living in Africa than in the rest of the world at these points in time. It is also worth noting that the numbers increase over the periods (suggesting limited return migration) and that the male migrants outnumber the female migrants.

Table 4.6: Stock of Zimbabweans in Africa and Outside of Africa interpolated to Zimbabwean census dates

	Africa			Outside Africa		
	Males	Females	Total	Males	Females	Total
1992	83,452	76,790	160,242	23,864	26,306	50,170
2002	153,943	116,197	270,140	53,958	61,213	115,171
2012	402,865	249,717	652,581	108,083	121,137	229,220

Table 4.7 shows the net number of Zimbabwean migrants for the two intercensal periods, estimated from the numbers of stock in Table 4.6. They were produced using the survival factors for Zimbabweans in South Africa for the Zimbabweans in Africa and the survival factors for the Zimbabweans in the UK for the Zimbabweans migrants out of Africa. It can be noted from the observation that the net number of migrants increased in the second intercensal period and that the net number of Zimbabwean migrants is more in Africa compared to the rest of the world for both periods.

Table 4.7: Net number of Zimbabwean migrants in the two intercensal periods

	Africa			Outside Africa			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Both
1992-2002	81,803	47,596	129,400	33,059	37,916	70,975	114,862	85,513	200,375
2002-2012	281,317	153,523	434,840	60,288	66,179	126,467	341,605	219,703	561,307
			564,240			197,442			761,682

4.3 Child women ratio correction to the Hill and Wong estimates

The estimates for the 0-4 and 5-9 age groups after applying the Hill and Wong (2005) method to the Zimbabwean census data, were highly implausible. To correct for this, we used the estimates of the net number of migrants derived from the South African census, with the assumption that they moved mid-way through the census to derive child women ratios and then applied these to the numbers of Zimbabwean women

emigrants. We also assumed that the fertility rates and mortality rates for the Zimbabwean immigrants in South Africa are the same as Zimbabweans in Zimbabwe. According to Crush, Chikanda and Tawodzera (2015) Zimbabweans see South Africa as their longer-term destination, hence we would expect the women to migrate with their children since the children still need their care. According to Crush, Chikanda and Tawodzera (2012), 28 per cent of the Zimbabwean migrants in Johannesburg and Cape Town were children who were with their parents or guardians. However, it should be noted that this approach will underestimate the proportions of children if the mothers did not identify as Zimbabwean in the South African census. Also, this approach could overestimate the proportions of children if the children were born after the mothers had migrated. Table 4.8 below shows the estimates of child women ratios from the net number of Zimbabwean migrants to South Africa. Applying the child women ratios to the net number of women Zimbabwean migrants derived using the Hill and Wong (2005), we estimated the net number of Zimbabwean migrants in the under 10 age groups.

Table 4.8: Child Women Ratios from the net number of Zimbabwean migrants in South Africa

	1996-2001		2001-2011	
	male	female	male	female
0-4	0.062	0.064	0.051	0.050
5-9	0.022	0.022	0.042	0.040

Table 4.9 below shows the estimates for the 0-4 and 5-9 age groups, obtained by applying the child women ratios to the estimates of the net number of migrants from Zimbabwe derived from the Zimbabwean census. From observation, it can be noted that the children in the 0-4 age group have a higher proportion compared to the 5-9 age group as might be expected since they still need more motherly care and support.

Table 4.9: Net number of migrants from Zimbabwe using child women ratio

	1992-2002			2002-2012		
	males	females	total	males	females	total
0-4	-19,423	-19,906	-39,329	-15,772	-15,295	-31,067
5-9	-5,192	-5,168	-10,360	-7,761	-7,479	-15,240

4.4 Comparison with estimates from other sources

An important question is how the estimates derived in this research compare to estimates from other sources. The estimates we obtained for the net migration from

Zimbabwe are compared to the net migration estimates from other sources. However, it must be noted that there are few sources against which to compare our estimates due to the difficulty in estimating international migration in developing countries because there are few data sources that capture migration.

4.4.1 Comparison of the net number of migrants

For the comparison, the estimates of the net number of Zimbabwean derived from the Zimbabwean census data were compared to the alternative estimates derived in this research and to the estimates from Chetsanga and Muchenje (2003), Pasura (2008) and the Zimstat (2015b). Table 4.10 below shows the comparison of the total net number of migrants by sex and

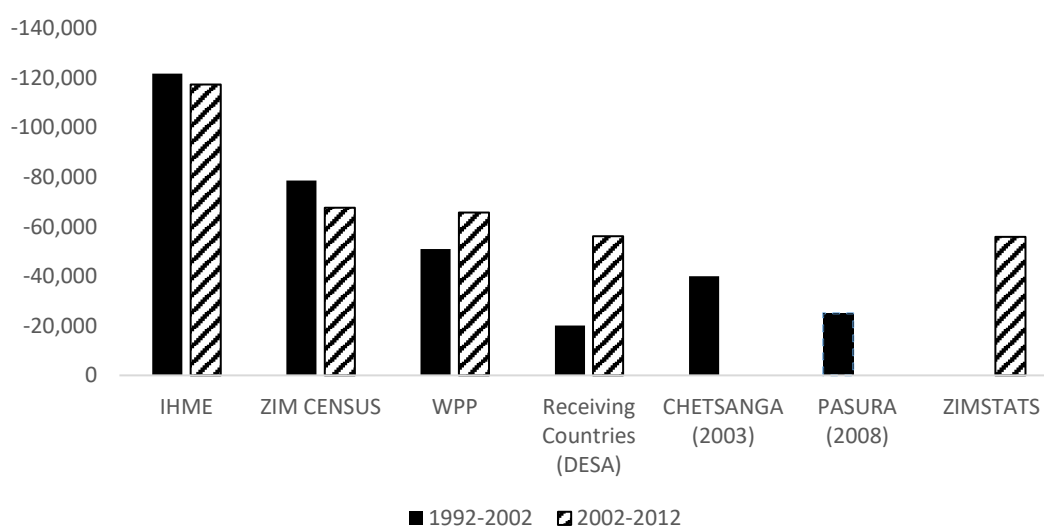
Figure 4.10 shows graphically the annual net number of migrants in the two intercensal periods.

Table 4.10: Comparison of estimates for the net number of Zimbabwean migrants

Source of Estimate	1992-2002			2002-2012			Grand total
	Males	Females	Total	Males	Females	Total	
Zim Census	-411,136	-375,013	-786,148	-412,913	-263,559	-676,472	-1,462,620
WPP	-305,746	-203,776	-509,523	-436,471	-219,781	-656,252	-1,165,775
Receiving Countries (DESA)	-114,862	-85,513	-200,375	-341,605	-219,703	-561,307	-761,682
IHME	-641,086	-575,283	-1,216,369	-655,118	-517,249	-1,172,366	-2,388,736
Chetsanga (2003)	-	-	-479,348	-	-	-	-
Pasura (2008)	-	-	-200,000	-	-	-	-
ZIMSTATS	-	-	-	-	-	-558,303	-

Note: Zim census= Zimbabwean Census, WPP= World population prospects, Zimstats = Zimbabwe National Statistics Agency, IHME = Institute of Health Metric Evaluation and DESA = Department of Economic and Social Affairs

Figure 4.10: Comparison of estimates annual estimates for the net number of Zimbabwean migrants for the period 1992-2012



From Table 4.10 and Figure 4.10 above, our estimates derived using data from the Zimbabwean Census data (Zim Census/ZIM CENSUS) suggest that there were 1.5 million emigrants over the two intercensal periods combined. Also, they suggest that there was a decrease in the annual emigration in the second intercensal period compared to the first intercensal period.

Comparing our estimates derived from the Zimbabwean census to the estimates derived from the United Nations' World Population Prospects (United Nations 2017d) data in Spectrum, suggest that there were 1.2 million emigrants over the two intercensal periods. This suggests that these estimates underestimate the total net number of emigrants over the two periods by 20 per-cent. Similarly, the WPP estimates also underestimate the annual number of emigrants by 35 per-cent in the first intercensal period and by two per-cent in the second intercensal period. The differences could be due to differentials in the population stock estimates or the migration assumptions in the spectrum model underestimated the migration from Zimbabwe.

The next set of estimates we compared to were derived using data for receiving countries from DESA (United Nations 2017e), these estimates underestimate the total number of emigrants in the two intercensal periods by 47 per-cent. Similarly, the DESA estimates also under-estimate the annual emigration estimates for the first and the second intercensal period by 74 per-cent and 17 per-cent, respectively. This could be due to illegal immigrants not being captured by receiving countries and other difficulties in capturing such data.

The third set of estimates were derived using data from the Institute for Health Metrics and Evaluation (2018), these suggest a much higher total net number of emigrants compared to all the other estimates over each intercensal period. This is largely due to the high estimates of net number of emigrants in the young age-groups. Also, they suggest that the net number of migrants decreased from the first intercensal period to the second intercensal period, which is consistent with our estimates.

The fourth set of estimates are by Chetsanga and Muchenje (2003), who estimated that the total number of Zimbabwean emigrants in the period of 1990-2002, is 479,348. They used data from questionnaires sent to countries identified as major receivers of Zimbabweans and sample data of Zimbabweans in the UK to project an estimate of the total number of emigrants from Zimbabweans around the world. Comparing these estimates to our estimates derived from the Zimbabwean census, from both Table 4.10 and

Figure 4.10, it can be noted that they underestimate the net number of emigrants. This is mainly due to the under-coverage of the survey they used to derive the estimates for the number of Zimbabwean emigrants. The survey was done in the UK and it targeted professional Zimbabwean migrants and thus, using it to estimate the total number of Zimbabweans who left Zimbabwe during the period 1990-2002 underestimates the total number, as the survey under-represents the targeted population.

Considering the estimates by Pasura (2008) next, he notes that he used data from a sample of Zimbabweans in the UK and a range of published and unpublished sources to estimate the Zimbabwean international migration in five phases from 1960-2006. However, he does not specify the methods used to derive the estimates, nor did he estimate the migration by sex or by age group. From both Table 4.10 and

Figure 4.10, it can be noted that his estimates underestimate the net number of migrants compared to the estimates derived from the Zimbabwean census data. It could be that the estimates by Pasura (2008), are lower due to the fact that the sample used in his research only focused on professional Zimbabweans migrants in the UK and hence using this sample to estimate the number of Zimbabwean emigrants underestimates the number of Zimbabwean migrants due to the coverage error in the sample. However, comparing annual estimates, the estimate by Pasura (2008) and our estimates from the DESA are similar in magnitude.

The sixth estimate is from Zimstat (2015b), they suggest that for the intercensal period between the 2002 and 2012 censuses, the number of Zimbabwean emigrants is 558,303 persons. Comparing this estimate to our estimate for the second intercensal period, these estimates underestimate the net number of emigrants for the period. This is largely due to the differences in fertility and mortality assumptions.

4.4.2 Comparison of the net number of migrants by age-group and sex

Figures 4.11 to 4.14, presents the net numbers of migrants by age and sex for the two intercensal periods, for the ZIM CENSUS, IHME, WPP, and the DESA estimates. From these, it can be seen that the age distribution of net migration is similar, but the levels for both intercensal periods differ. All the estimates suggest that migration is concentrated in the economically active age groups and that it is much higher in male migrants than female migrants in both intercensal periods. This suggests emigration for seeking employment opportunities. It can also be noted that all the estimates show emigration in the younger age group 0-4 years, this suggests migration of families make up part of the migration in both intercensal periods.

Figure 4.11: Net number of migrants estimates for males by age group from the Zimbabwean 1992 and 2002 censuses

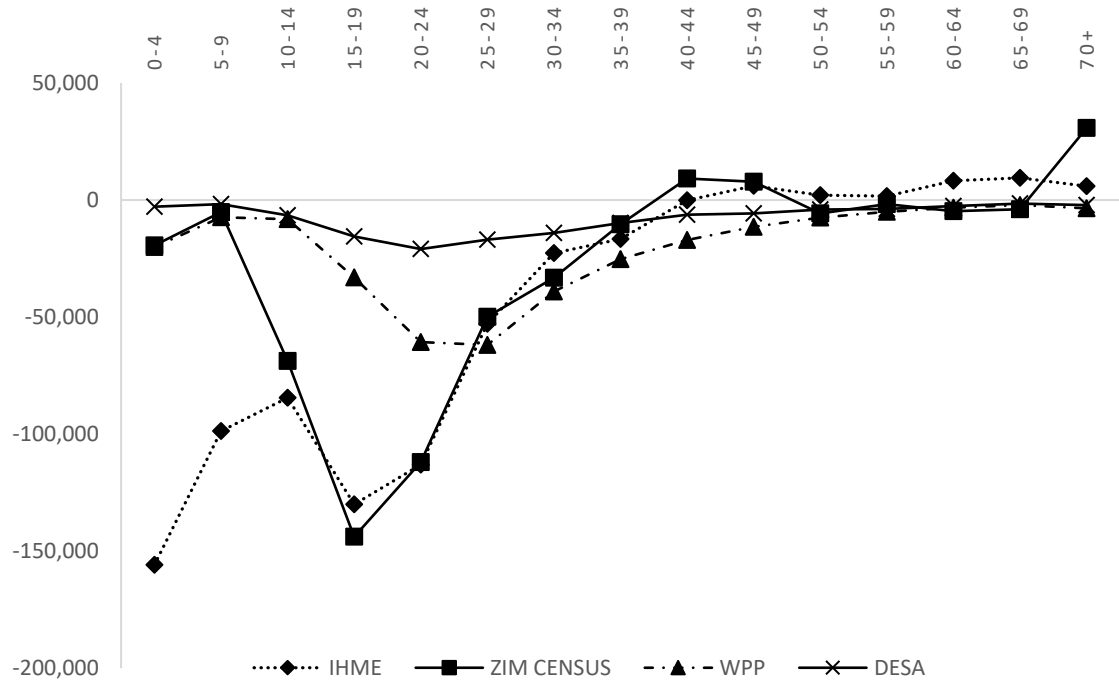


Figure 4.12: Net number of migrants estimates for females from the Zimbabwean 1992 and 2002 censuses

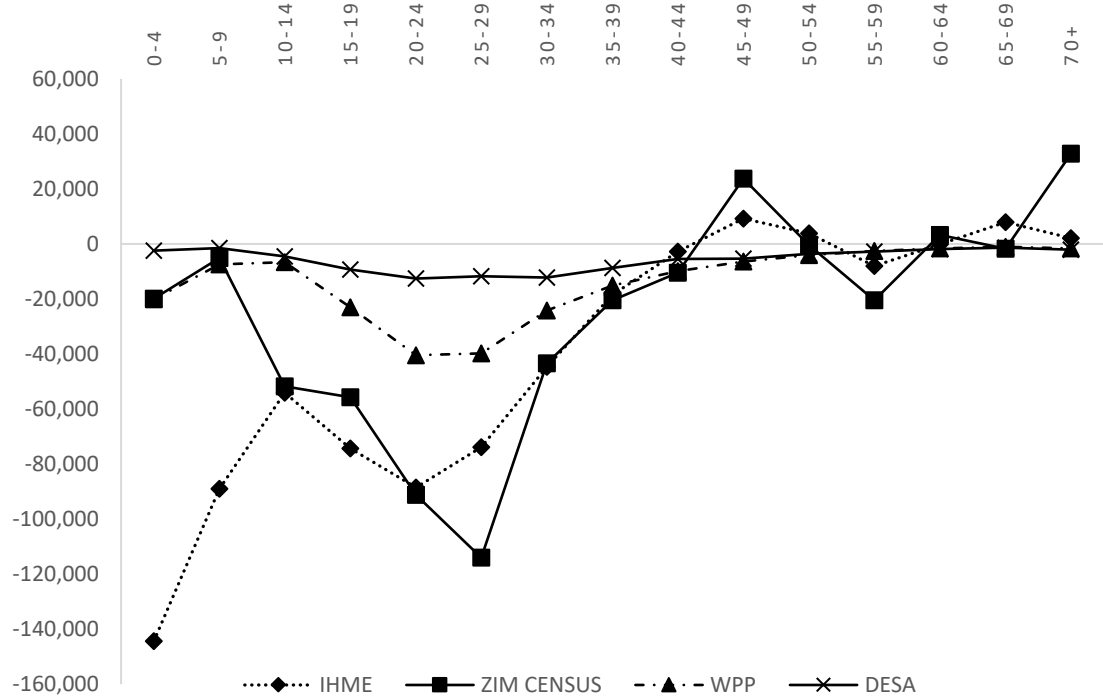


Figure 4.13: Net number of migrants estimates for males by age group from the Zimbabwean 2002 and 2012 censuses

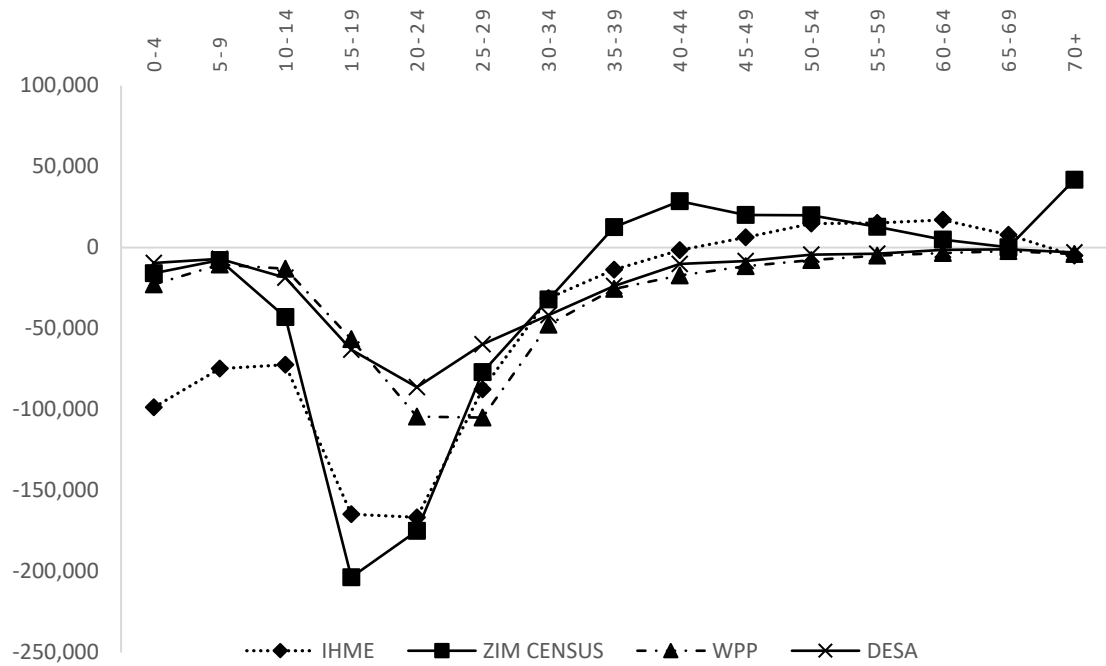
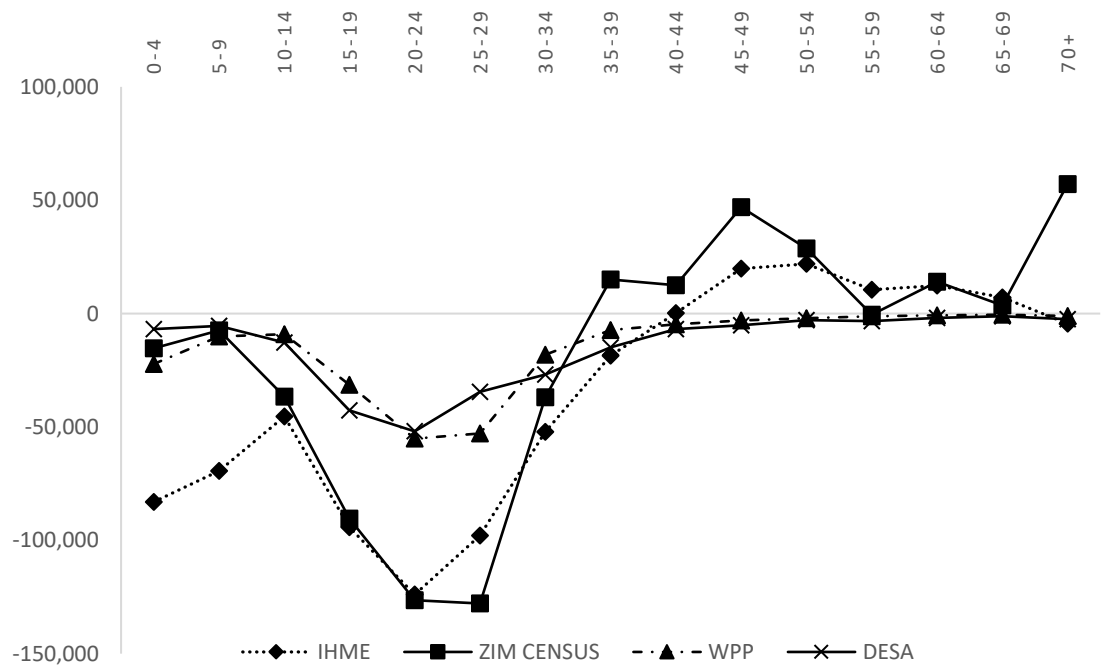


Figure 4.14: Net number of migrants estimates for females by age group from the Zimbabwean 2002 and 2012 censuses



Looking at the first intercensal period, it can be seen that the migration pattern in the younger age groups 0-4 and 5-9 years are consistent with each other, for the ZIM CENSUS and WPP estimates. However, the IHME estimates suggest an implausibly high net number of children emigrants, which suggests errors in the population estimates, and either an overestimation in the fertility assumptions or an underestimation of the mortality estimates. The estimates derived from the receiving countries and DESA data suggest a lower number of emigrants in the 0-4 age group, this could be explained by an under coverage of data sources from net receiving countries.

As we move up the age groups, it can be observed that the estimates suggest that the net number of migrants are concentrated in the economically active age groups, between the ages 15 to 35 for both sexes, suggesting labour migration. From observation, our estimates using the Zimbabwean census are consistent with the estimates derived from the IHME data except for the very younger ages. However, the estimates from the WPP and the DESA data suggest a relatively low level of emigration in these age groups. This could be explained by an under enumeration in the migrant population in these age groups, as a result of the illegal migrants not being captured. A notable observation from Figure 4.11, is that the estimates from the Zimbabwean census and the estimates from IHME data both suggest a trough in an earlier age group, compared to the estimates from the WPP and the DESA data. Also, in the estimates of female migrants in Figure 4.12, a peak can be observed surprisingly in the age group 25-39 years for the Zimbabwean census estimates, which is an older age group compared to the other estimates. These differences could be a result of differences in the age-specific mortality, or they can be due to age misspecification.

In the older age groups, all the estimates are consistent with each other and they are close to zero as we would expect, due to low migration at these ages. However, in the last age group 70+ for both males and females, the ZIM CENSUS estimates suggest return migration which is highly implausible. This is probably a result of age exaggeration in the census population.

In the second intercensal period according to Figures 4.11 and 4.14, a very similar pattern to that found in the first intercensal period, however, with a higher magnitude in the net emigration. Furthermore, it needs to be noted that the estimates suggest net return migration in older economic age groups. It can also be observed that the

estimates from the receiving countries and DESA data are quite consistent with the estimates derived from WPP data.

4.4.3 Comparison of the standardised net migration rates by age-group and sex

Figure 4.15, Figure 4.16 and Table A. 8, present the standardised estimates for the net migration rates for Zimbabwe. These were obtained by dividing the number of Zimbabweans by the average number of persons exposed to the risk of becoming migrants in each age-group. In both intercensal periods the estimates suggest that emigration is concentrated in the economically active age-groups. The IHME and ZIM CENSUS estimates show similar patterns in both intercensal periods, with the WPP and particularly DESA suggesting lower and later peaking net migration rates.

Figure 4.15: Zimbabwean net migration rates per 1000 persons in the first intercensal period

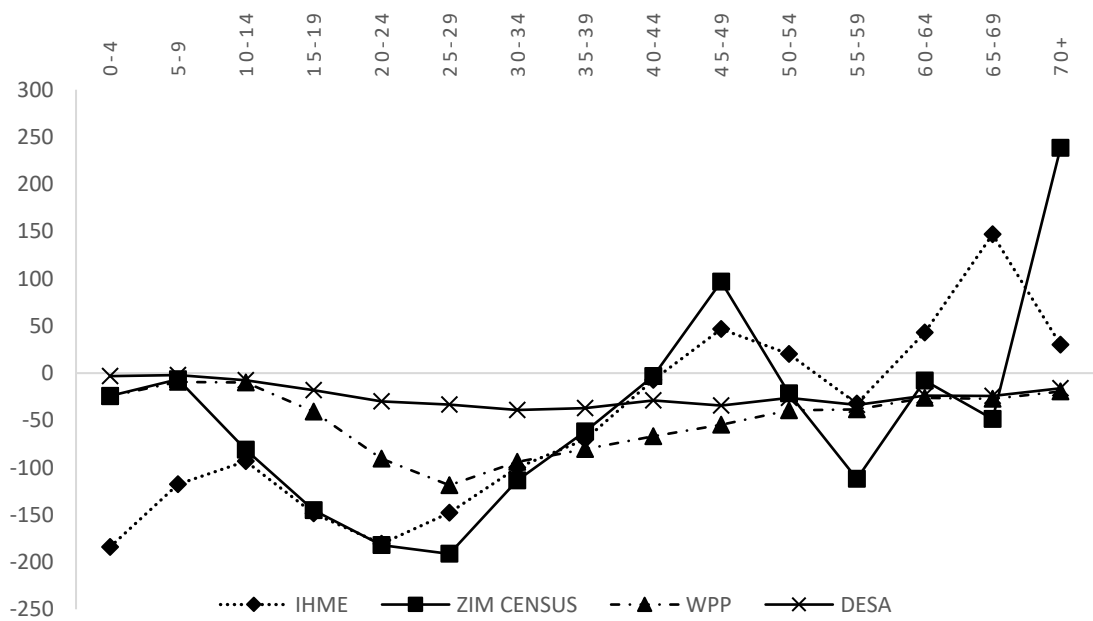
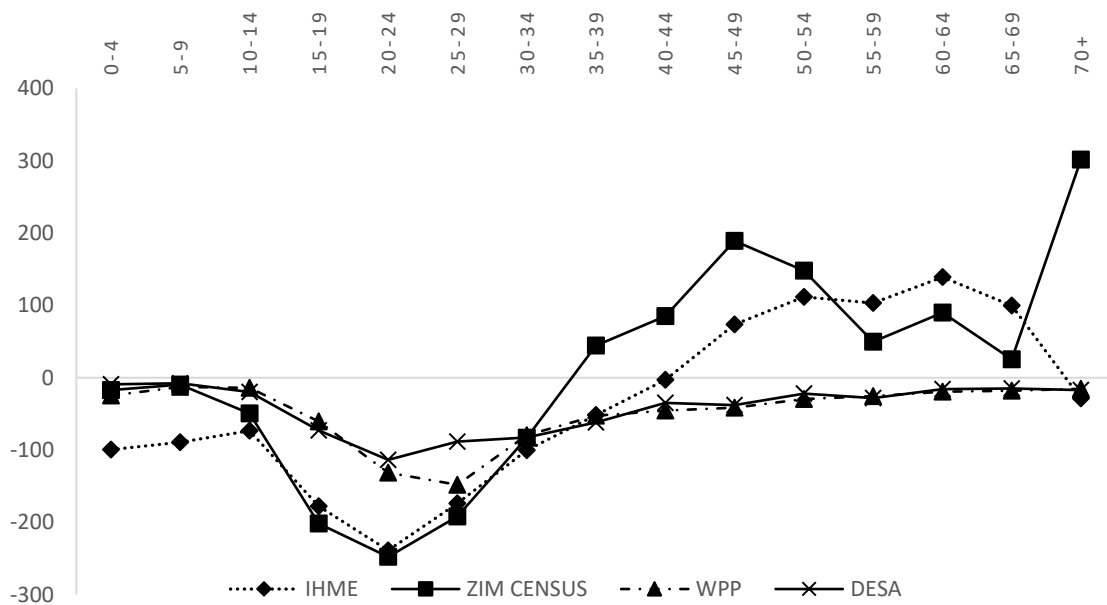


Figure 4.16: Zimbabwean net migration rates per 1000 persons in the second intercensal period



5.1 Introduction

This chapter discusses the estimates of the net number of Zimbabwean migrants obtained in this study. The main objective of this research was to estimate the net number of Zimbabwean migrants during the period 1992-2012. In addition to this, the research had to identify the major receiving countries of Zimbabwean migrants. It used their census data and other data sources to derive an estimate of the total net number of Zimbabwean migrants. Thus, this chapter reflects on the results obtained and determines whether the objectives of this research were accomplished. Furthermore, conclusions are drawn, possible future research that arises from this study outlined and the limitations of the study are highlighted.

5.2 Discussion of results

The main purpose of this study was to produce reasonable estimates of the net number of emigrants from Zimbabwe for the period 1992-2012. Thus, the first step was to use the Zimbabwean census data to estimate the net number of migrants. The second step, was to use other data from IHME, DESA, South Africa census, UK census and WPP to derive alternative estimates of the net number of Zimbabwean migrants, in order to evaluate the soundness of the estimates derived from the Zimbabwean census.

Despite the disparities in the data quality, the findings of this study are to some extent consistent with the net migration estimates implied by the other data sources (see Figures 4.11 to 4.14). The study suggests that the total net number of Zimbabwean migrants in the period 1992-2012 ranges between -761,682 and -1,462,620. In general, the estimates of this study are within the wide range of estimates in the literature and the alternative estimates derived in the study. Since little is known about the actual numbers of Zimbabwean emigrants, in this study we present our estimates as a range obtained from the estimates derived from the census data and those from the net receiving countries.

The study shows movement of children under-ten, presumably with one or more parents. Corresponding to the findings of this study, a report by UNICEF (2020) notes that South Africa is amongst the main destinations to migrant children in Africa. Furthermore, Crush, Chikanda and Tawodzera (2012), found that more children and

young people were living with their parents and guardians from the Zimbabwean migration in Cape Town and Johannesburg.

The research also shows that the bulk of the Zimbabwean emigrants consists of economically active age-groups and that the total number of economically active Zimbabwean migrants increased in the second intercensal period compared to the first intercensal period. However, this is only observed in Zimbabwean migrants to countries in Africa. This is consistent with most of the findings in the literature covered in Chapter 2, suggesting a third wave in the migration from Zimbabwe, mainly in search of employment due to the decline of the economic conditions in Zimbabwe. The study's findings, amongst other things, suggest that there were more Zimbabwean migrants to African countries than the rest of the world in both intercensal periods.

Other findings worth noting are the peaks in the economic age groups for the net number of Zimbabwean migrants for both sexes, in both intercensal periods. Quite surprisingly, these peaks start at an early age group 10-14 years and end in the age group 35-39 years. In addition, the net number of male migrants was found to be higher than the net number of female migrants in both intercensal periods. Crush, Chikanda and Tawodzera (2012) also found that 35 per cent of Zimbabwean migrants to South African had never had a job in Zimbabwe, indicating that they had left Zimbabwe after finishing secondary education. Also, the net number of male migrants was found to be higher than the net number of female migrants in both intercensal periods.

From this study's findings, there is evidence of the feminisation of migration, as the women Zimbabwean emigrants are a significant proportion of the total net number of Zimbabwean emigrants for the two intercensal periods. There were more than 50 per cent females in the net number of migrants out of Africa to the rest of the world in both intercensal periods. According to O'Neil, Fleury and Foresti (2016), migration in females can increase women's access to education and economic resources and they note that these matter for gender equality and in the achieving of the Sustainable Development Goals (SDGs) for both the residence and the destination countries.

5.3 Limitations of the Study

There are several limitations associated with the estimation of international migration, due to its complex nature and given that the readily available data on migration is limited. Also, there is no consistent set of migration flow data that are available due to the multiple data sources, definitions, and timings of collection. A major limitation of

the study was the lack of migration information and data on Zimbabwean migration. Hence, we were limited to the use only of census data, and indirect approaches were employed to estimate the emigration from Zimbabwe. An effort was made to contact the Zimstat offices to get information on how they estimated the net migration for the second intercensal period in their thematic report Zimstat (2015b), but this was not successful.

Another limitation of the study was the unavailability of vital registration. To estimate the births and deaths the study used estimates for the annual births and lifetables from World Population Prospect (United Nations 2017d) for the Zimbabwean population in the two intercensal periods and also CWR from the estimates of Zimbabwean migrants in South Africa. Furthermore, for the mortality estimates for the Zimbabweans to the countries outside of Africa, the South African White life tables from the 1980s were used, which could be inappropriate – although this was unlikely to impact on the estimates greatly.

The findings of the study may not reflect the status of emigration in Zimbabwe due to the lack of current data. The study used the intercensal periods, as census data was the only data available from Zimbabwe. Also, the study did not estimate the completeness of the different census data used, largely due to the unavailability of vital registration for the Zimbabwean populations during the period of interest.

Data errors were evident in the younger age groups and the older ages, which are more sensitive to data problems. Furthermore, the research attempted to estimate the net number of migrants in the two intercensal periods by applying the Hill and Queiroz (2010) method. However, this yielded implausible results, possibly because of the method's inability to distinguish migration from HIV/AIDS mortality in similar age ranges, so it was of no use. Lastly, due to the nature of international migration in that it involves more than one country, it is impossible to accurately collect migration data from all the destination countries, especially in third world countries. Also, due to unknown levels of coverage in data sources, there might be hidden migration which might lead to bias in the estimates.

5.4 **Areas for further study**

The study used estimates of mortality and fertility for the two intercensal periods from the United Nations World Population Prospects (United Nations 2017d). Further studies should endeavour to estimate mortality and fertility rates, using indirect methods

and also to use other data sources like the Demographic Health Survey. Further investigations should be considered on how to apply the technique proposed by Hill and Queiroz (2010) to estimate the net number of Zimbabwean migrants while estimating the completeness of the censuses, and this will effectively improve the quality of the estimates of the net number of migrants.

Further research can fit a migration schedule by applying the Rogers and Castro (1984) method, to represent the typical age patterns of the migration, and reflect the dependency between migration and age. This could provide a better understanding of the pattern of migration by age. However, in developing countries the quality of the underlying data may not permit such finely grained calculations (Moultrie, Dorrington, Hill *et al.* 2013).

As part of further research, analysing other data sources from the net receiving countries of Zimbabwean migrants to estimate the completeness of the censuses in capturing the Zimbabwean-born populations. Effectively, this will improve the quality of the estimates of Zimbabwean immigrants. In addition, a sensitivity analysis could be done to see how the data from the resident and the destination countries affect the estimates of the net number of migrants.

A question that asks about international emigration can be added to the country's census questions, however, this won't capture the data of the households that disintegrated as a result of emigration. This will help further understand the nature of the Zimbabwean migration and would be essential in estimating the number of undocumented migrants which censuses and surveys from net receiving countries fail to capture.

A final area of further research would be to use simulation models to test for the significance of suspected errors in the data.

5.5 Conclusion

This research set out to estimate the net migration from Zimbabwe in the period 1992-2012. We used census data from Zimbabwe, and the major receiving countries (South Africa and the UK). In addition, we used other sources of data to derive population, mortality and fertility estimates for Zimbabweans. To some extent, we were successful in estimating the number of Zimbabwean migrants, however, due to the differences between the estimates from various sources we were not able to produce a

single estimate, instead, we presented the estimates as a range. The estimates derived in this study fall within the range with the alternative estimates derived from other sources.

The estimates produced in this research using census data from Zimbabwe appear to be plausible for ages 10 years and older. Data errors were evident in the emigration estimates for the under-ten population, derived from the Zimbabwean census data, hence alternative estimates were derived using the CWR from the net number of Zimbabwean immigrants in South Africa.

The findings of this research suggest that the net number of Zimbabwean migrants is more concentrated in the economically active age groups. The number of female migrants also increased over time, but the number of male migrants was higher than the number of female migrants in both intercensal periods. Less migration is observed in the older age groups, even possible evidence of return migration. These features are consistent in all the estimates reviewed in this research.

REFERENCES

- Abel, Guy J. 2013. "Estimating global migration flow tables using place of birth data", *Demographic Research* **28**:505-546.
- Abel, Guy J and Joel E Cohen. 2019. "Bilateral international migration flow estimates for 200 countries", *Scientific data* **6**(1):1-13.
- ACP Observatory on Migration. 2011. *Migration Research guide South-South Migration and Developement* ACPOBS/2011/PUB01. Belgium: ACP Observatory on Migration, . <http://eea.iom.int/images/Pubs/OSSM/EN-ACP-Obs-Research-GuidFinal-06112012.pdf>
- Adepoju, Aderanti. 2000. "Issues and recent trends in international migration in Sub-Saharan Africa", *International Social Science Journal* **52**(165):383-394.
- Adepoju, Aderanti. 2006. "Internal and international migration within Africa", *Migration in south and Southern Africa: Dynamics and determinants*:26-46.
- Azose, Jonathan Jerome. 2016. "Projection and Estimation of International Migration." Unpublished Doctor of Philosophy thesis, University of Washington.
- Beine, Michel and Christopher Parsons. 2015. "Climatic factors as determinants of international migration", *The Scandinavian Journal of Economics* **117**(2):723-767.
- Bhat, PN Mari. 2002. "General growth balance method: a reformulation for populations open to migration", *Population Studies* **56**(1):23-34.
- Bloch, Alice. 2005. *The Development Potential of Zimbabweans in the Diaspora: A Survey of Zimbabweans Living in the UK and South Africa*. 17. Switzerland: International Organization for Migration. https://publications.iom.int/system/files/pdf/mrs17_0.pdf
- Bloch, Alice. 2006. "Emigration from Zimbabwe: migrant perspectives", *Social Policy & Administration* **40**(1):67-87.
- Brass, William. 1975. "Methods for estimating fertility and mortality from limited and defective data," Paper presented at Demographic Analysis Research techniques. Latin American Demographic Center, 16-24 September 1971. University of North Carolina.
- Carballo, Manuel and Aditi Nerukar. 2001. "Migration, refugees, and health risks", *Emerging infectious diseases* **7**(3 Suppl):556.
- Castro, Luis J and Andrei Rogers. 1983. "What the age composition of migrants can tell us", *Population Bulletin of the United Nations* (15):63 -79.
- Chereni, Admire and Paradzayi P Bongo. 2018. *Migration in Zimbabwe*. Zimbabwe: Zimbabwe National Statistics Agency (ZIMSTAT) , International Organization for Migration (IOM). https://publications.iom.int/system/files/pdf/mp_zimbabwe_2018.pdf
- Chetsanga, CJ and TB Muchenje. 2003. "An analysis of the cause and effect of the brain drain in Zimbabwe", *Harare: Scientific and Industrial Research and Development Centre (SIRDC)*
- Chikanda, Abel. 2006. "Skilled health professionals' migration and its impact on health delivery in Zimbabwe", *Journal of ethnic and migration studies* **32**(04):667-680.
- Crush, Jonathan , Daniel Tevera 2010. "Exiting Zimbabwe," in Tevera, Jonathan Crush and Daniel (ed). *Zimbabwe's exodus: crisis, migration, survival*. SAMP, Cape Town and International Development Research Centre, Ottawa, pp. 1-42.
- Crush, Jonathan, Abel Chikanda and Godfrey Tawodzera. 2012. *The third wave: Mixed migration from Zimbabwe to South Africa*. Southern African Migration Programme Kingston.

- Crush, Jonathan, Abel Chikanda and Godfrey Tawodzera. 2015. "The third wave: mixed migration from Zimbabwe to South Africa", *Canadian Journal of African Studies/Revue canadienne des études africaines* **49**(2):363-382.
- Del Fava, Emanuele, Arkadiusz Wiśniowski and Emilio Zagheni. 2019. "Modelling International Migration Flows by Integrating Multiple Data Sources", Department of Home Affairs. 2017. *White paper on international migration in South Africa*. Republic of South Africa: http://www.dha.gov.za/WHITE_PAPER_INTERNATIONAL_MIGRATION-APPROVED.pdf
- Dov, Raphael. 2016. "Does immigration affect mortality? A study of the effects of immigration from the former Soviet Union to Israel," Paper presented at MWG meeting. St Petersburg.
- Hill, Kenneth. 1987. "New approaches to the estimation of migration flows from census and administrative data sources", *International Migration Review*:1279-1303.
- Hill, Kenneth and Bernardo Queiroz. 2010. "Adjusting the general growth balance method for migration", *Revista Brasileira de Estudos de População* **27**(1):7-20.
- Hill, Kenneth and Rebeca Wong. 2005. "Mexico–US migration: Views from both sides of the border", *Population and Development Review* **31**(1):1-18.
- Humphris, Rachel. 2010. "Zimbabweans in the UK", *ICAR population guides series*. Retrieved July 9:2012.
- Institute for Health Metrics and Evaluation, (IHME). 2018. *Global Burden of Disease Study 2017 (GBD 2017)*. Seattle, United States: IHME. <http://ghdx.healthdata.org/gbd-results-tool>. Accessed: 06/02/2019
- International Organisation of Migration. 2018. *Migration data portal*. Berlin: IOM's GMDAC. <https://migrationdataportal.org/themes/migration-data-sources>. Accessed: 11/03/2018
- International Organization for Migration. 2015. *IOM ZIMBABWE 2015 ANNUAL REPORT*. International Organization for Migration Zimbabwe <https://www.iom.int/sites/default/files/country/docs/zimbabwe/IOM-Zimbabwe-AR-25Aug2016.pdf>. Accessed: 2/11/2018
- IPUMS-INTERNATIONAL. 2018. *Integrated Public Use Microdata Series, International: Version 7.1 [dataset]*. Minneapolis, MN: IPUMS: Minnesota Population Center. <https://doi.org/10.18128/D020.V7.1>. Accessed: 24/06/2018
- Jensen, Eric B. 2013. "A review of methods for estimating emigration", *Washington DC: US Census Bureau (Population Division Working Paper 101)* (Working Paper No. 101)
- Kawewe, Saliwe M and Robert Dibie. 2000. "The impact of economic structural adjustment programs [ESAPs] on women and children: implications for social welfare in Zimbabwe", *J. Soc. & Soc. Welfare* **27**:79.
- Luebker, Malte. 2008. "Employment, unemployment and informality in Zimbabwe: Concepts and data for coherent policy-making",
- Makina, D. 2010. "Zimbabwe in Johannesburg," in Crush Jonathan, Daniel Tevera (ed). *Zimbabwe's exodus: crisis, migration, survival*. SAMP, Cape Town and International Development Research Centre, Ottawa, pp. 225-239.
- Mlambo, Alois S. . 2010. "A History of Zimbabwean Migration to 1990," in Crush Jonathan, Daniel Tevera (ed). *Zimbabwe's exodus: crisis, migration, survival*. SAMP, Cape Town and International Development Research Centre, Ottawa, pp. 53-76.
- Moultrie, Tom A, RE Dorrington, Allan G Hill, Kenneth Hill *et al.* 2013. *Tools for demographic estimation*. International Union for the Scientific Study of Population. <http://demographicestimation.iussp.org/content/general-assessment-age-and-sex-data>.

- Muzondidya, James. 2008. "Majoni-joni: Survival strategies among Zimbabwean migrants in South Africa," Paper presented at International Conference on the Political Economies of Displacement Wits University Human Sciences Research Council.
- Ndlovu, Mary E. 2013. "ZIMBABWE'S EDUCATIONAL LEGACY FROM THE 1980S: WAS IT ALL SO ROSY?", Retrieved July 29:2013.
- O'Neil, Tammie, Anjali Fleury and Marta Foresti. 2016. *Women on the move migration, gender equality and the 2030 agenda for sustainable development*. Overseas Development Institute.
- OECD (2017) Organization for Economic Co-operation and Development, Paris.
- Oecd.Stat. 2017. *OECD international migration database*. Paris: Organization for Economic Co-operation and Development.
<http://stats.oecd.org/Index.aspx?DataSetCode=MIG>. Accessed: 11/04/2019
- Pasura, Dominic Mazorodze. 2008. "A fractured diaspora: strategies and identities among Zimbabweans in Britain." Unpublished thesis, University of Warwick.
- Potts, Deborah. 2013. "Rural–urban and urban–rural migration flows as indicators of economic opportunity in Sub-Saharan Africa: What do the data tell us", *Migrating out of poverty research programme working paper*
- Quattrochi, John, Joshua A Salomon, Kenneth Hill and Marcia C Castro. 2019. "Measuring and correcting bias in indirect estimates of under-5 mortality in populations affected by HIV/AIDS: a simulation study", *BMC public health* **19**(1):1516.
- Raftopoulos, Brian and Alois Mlambo. 2008. *Becoming Zimbabwe. A History from the Pre-colonial Period to 2008: A History from the Pre-colonial Period to 2008*. African Books Collective.
- Raymer, James, Guy J Abel, George Disney and Arkadiusz Wisniowski. 2011. *Improving estimates of migration flows to Eurostat*. 2042-4116. ESRC Centre for Population Change Working Paper.
http://www.cpc.ac.uk/docs/2011_WP15_Improving_Estimates_of_Migration_Flows_Raymer_et_al.pdf
- Raymer, James, Arkadiusz Wiśniowski, Jonathan J Forster, Peter WF Smith *et al.* 2013. "Integrated modeling of European migration", *Journal of the American Statistical Association* **108**(503):801-819.
- Rogers, Andrei and Luis J Castro. 1984. "What the age composition of migrants can tell us", *Population Bulletin of the United Nations* 1983
- Schachter, Jason P. 2009. *Data assessment of labour migration statistics in the SADC region: South Africa, Zambia, Zimbabwe*. International Organization for Migration
<http://southafrica.iom.int/publications/data-assessment-labour-migration-statistics-sadc-region-south-africa-zambia-and-zimbabwe>
- Schoumaker, Bruno and Cris Beauchemin. 2015. "Reconstructing trends in international migration with three questions in household surveys: Lessons from the MAFE project", *Demographic Research* **32**:983-1030.
- Siegel, Jacob S and David A Swanson. 2004. *The Methods and Materials of Demography*. London: Elsevier Academic Press.
- Tevera, Daniel, Zinyama, Lovemore. 2002. *Zimbabweans who move: Perspectives on international migration in Zimbabwe*. Cape Town: Idasa, Southern African Research Centre and Queens University, Canada.
- UNICEF (2020) Ed, ldblquote\rdblquoReddy, Sudeshan) UNICEF South Africa, South Africa.

- United Nations. 1998. *Recommendations on Statistics of International Migration*. New York: Population Division, United Nations Department of economics and Social Affairs
- United Nations. 2014a. *Principles and Recommendations for Population and Housing Censuses, Revision 3*. UN.
https://unstats.un.org/Unsd/demographic/meetings/egm/NewYork/2014/P&R_Revision3.pdf
- United Nations. 2017a. *Handbook on Measuring International Migration through Population Censuses*. New York: <https://millenniumindicators.un.org/unsd/statcom/48th-session/documents/BG-4a-Migration-Handbook-E.pdf>
- United Nations. 2017b. *International Migration Report 2017: Highlights*. (ST/ESA/SER.A/404). New York: United Nations:
https://www.un.org/en/development/desa/population/migration/publications/migrationreport/docs/MigrationReport2017_Highlights.pdf
- United Nations. 2017c. *World Population Prospects : The 2017 Revision*. New York: United Nations.
<https://esa.un.org/unpd/wpp/Download/Standard/Interpolated/Annual>.
 Accessed: 09 May 2018
- United Nations, Department of Economic and Social Affairs, Population Division
 2017d. *World Population Prospects*. United Nations.
<https://population.un.org/wpp/Download/Standard/Migration/>. Accessed: 24/06/2018
- United Nations, Department of Economic Social Affairs. Population Division (2017).
 2017e. *Trends in International Migrant Stock: The 2017 Revision (United Nations database, POP/DB/MIG/Stock/Rev.2017)*. UN.
<http://www.un.org/en/development/desa/population/migration/data/estimates2/estimates17.shtml>. Accessed: 28/12/2018
- United Nations Population Division. 2013. *Migration Profiles* New York United Nations
<https://esa.un.org/migmgprofiles/indicators/files/Zimbabwe.pdf>. Accessed: 01/02/2018
- United Nations, Statistical Division. 2014b. *Demographic Statistics Database* New York: United Nations <http://data.un.org/Data.aspx?d=POP&f=tableCode%3a22>.
 Accessed: 12/04/2018
- Warren, Robert and Jennifer Marks Peck. 1980. "Foreign-born emigration from the United States: 1960 to 1970", *Demography* **17**(1):71-84.
- Willekens, Frans. 1999. "Modeling approaches to the indirect estimation of migration flows: From entropy to EM", *Mathematical Population Studies* **7**(3):239-278.
- Wiśniowski, Arkadiusz. 2017. "Combining Labour Force Survey data to estimate migration flows: The case of migration from Poland to the UK", *Journal of the Royal Statistical Society: Series A (Statistics in Society)* **180**(1):185-202.
- Zimstat. 2015a. *2012 Zimbabwe Population Census*
<https://zimbabwe.unfpa.org/en/publications/2012-census-thematic-report-population-projections>
- Zimstat. 2015b. *Zimbabwe population Census 2012*. Zimbabwe National Statistics Agency.
www.zimstat.co.zw/sites/default/files/img/publications/.../Mortality_Thematic.pdf

APPENDIX A

Table A. 1: Hill and Wong estimates for the male's net migration from Zimbabwe using Zimbabwean census data, 1992 and 2002

	Population of Zimbabwe		Deaths	Estimated	Net Number of migrants
	1992	2002	1992-2002	birthdays	
0-4	788,963	838,062	142,209	2,010,504	-265,974
5-9	821,319	764,453	38,835	1,553,223	3,239
10-14	724,905	754,587	14,491	1,574,492	-68,776
15-19	615,728	736,686	13,622	1,461,544	-143,843
20-24	470,355	568,341	25,281	1,183,120	-111,923
25-29	338,243	477,603	48,595	947,931	-49,906
30-34	282,177	372,660	68,696	710,070	-33,146
35-39	231,089	237,492	75,094	517,744	-10,397
40-44	175,579	196,189	72,209	425,850	9,133
45-49	146,533	166,700	54,773	342,164	7,758
50-54	134,265	129,007	43,724	274,982	-5,736
55-59	95,427	99,169	34,728	230,780	-1,716
60-64	96,230	95,168	28,990	190,595	-4,743
65-69	51,588	64,792	28,763	157,923	-3,972
70-74 *	58,718	60,772	28,867	111,983	30,746
75+	52,418	72,499	91,728		
Total 10-70+	N/A	N/A	N/A	N/A	-386,521
Total	5,083,537	5,634,180	810,606		-649,256

N/A = Not applicable, * = 70+ for net number of migrants

Table A. 2: Hill and Wong estimates of female net migration from Zimbabwe using Zimbabwean census data, 1992-2002 females

	Population of Zimbabwe		Deaths	Estimated	Net	Net Number of migrants both sexes
	1992	2002	1992-2002	birthdays	Number of migrants	
0-4	795,728	838,007	125,359	1,971,083	-238,694	-504,668
5-9	832,469	769,247	34,437	1,564,751	-5,171	-1,932
10-14	731,846	757,657	12,510	1,588,365	-51,718	-120,494
15-19	632,510	766,890	11,412	1,498,326	-55,693	-199,536
20-24	527,129	664,731	22,575	1,296,841	-91,211	-203,134
25-29	379,424	518,361	49,751	1,045,453	-114,017	-163,923
30-34	328,837	363,494	67,415	742,747	-43,427	-76,573
35-39	261,574	271,187	64,125	597,248	-20,464	-30,861
40-44	190,983	241,858	57,877	503,046	-10,448	-1,315
45-49	144,557	192,868	41,379	383,846	23,737	31,495
50-54	148,485	174,769	31,466	317,893	-507	-6,243
55-59	87,404	113,498	25,837	259,637	-20,441	-22,157
60-64	84,868	100,304	22,634	187,264	3,248	-1,495
65-69	51,298	68,454	19,810	152,441	-1,761	-5,733
70-74 *	62,965	63,019	21,677	113,715	32,763	63,509
75+	68,935	93,132	100,549			
Total 10-70+	N/A	N/A	N/A	N/A	-349,939	-736,460
Total	5,329,011	5,997,477	708,813		-593,804	-1,243,059

N/A = Not applicable, * = 70+ for net number of migrants

Table A. 3: Hill and Wong estimates of males' net migration from Zimbabwe using Zimbabwean census data, 2002-2012

	Population of Zimbabwe		Deaths	Estimated	Net
	2002	2012	2002-2012	birthdays	Migration
0-4	838,062	986,596	168,685	2,411,961	-411,633
5-9	764,453	845,062	49,214	1,683,109	58,398
10-14	754,587	849,473	21,124	1,611,685	-42,912
15-19	736,686	699,230	18,429	1,452,763	-203,557
20-24	568,341	545,827	26,363	1,268,232	-174,931
25-29	477,603	522,092	45,590	1,089,452	-76,864
30-34	372,660	445,466	80,958	922,510	-32,064
35-39	237,492	364,072	116,648	736,682	12,645
40-44	196,189	269,626	104,782	506,099	28,627
45-49	166,700	161,958	76,103	356,507	20,067
50-54	129,007	139,705	64,189	305,214	19,862
55-59	99,169	121,301	44,508	250,189	12,810
60-64	95,168	97,199	32,157	196,358	4,956
65-69	64,792	73,372	31,437	167,125	164
70-74 *	60,772	62,500	31,835	127,272	41,818
75+	72,499	97,060	110,965		
Total 10-70+	N/A	N/A	N/A	N/A	-389,380
Total	5,634,180	6,280,539	1,022,988		-742,614

N/A = Not applicable, * = 70+ for net number of migrants

Table A. 4: Hill and Wong estimates of female net migration from Zimbabwe using Zimbabwean census data, 2002-2012

	Population of Zimbabwe		Deaths	Estimated	Net	Net Migration
	2002	2012	2002-2012	birthdays	Migration	both sexes
0-4	838,007	991,878	145,770	2,364,668	-373,989	-785,622
5-9	769,247	853,098	43,165	1,691,038	49,567	107,965
10-14	757,657	846,174	18,685	1,613,588	-36,611	-79,523
15-19	766,890	712,803	15,755	1,469,776	-90,485	-294,043
20-24	664,731	655,131	22,380	1,417,623	-126,485	-301,416
25-29	518,361	614,609	57,287	1,278,358	-127,870	-204,734
30-34	363,494	479,354	104,892	996,953	-36,884	-68,947
35-39	271,187	375,927	121,113	739,317	15,024	27,670
40-44	241,858	257,479	99,322	528,488	12,468	41,095
45-49	192,868	187,597	73,165	426,014	46,969	67,037
50-54	174,769	212,706	59,023	405,089	28,705	48,567
55-59	113,498	162,295	44,153	336,833	-459	12,351
60-64	100,304	130,521	32,583	243,425	14,074	19,030
65-69	68,454	94,481	28,258	194,698	3,660	3,823
70-74 *	63,019	75,806	28,506	144,073	57,109	98,927
75+	93,132	130,840	122,181			
Total 10-70+	N/A	N/A	N/A	N/A	-240,785	-522,200
Total	5,997,477	6,780,700	1,016,237		-565,207	-1,307,821

N/A = Not applicable, * = 70+ for net number of migrants

Table A. 5: Zimbabwean-born population in the 1991 UK census

	Males	Females	Total
	10,071	11,181	21,252

Table A. 6: Zimbabwean-born population in the 2001 UK census

	Males	Females	Total
0-15	2,743	2,809	5,552
16-64	19,499	22,846	42,345
65+	433	1,194	1,627
Total	22,675	26,849	49,524

Table A. 7: Zimbabwean-born population in the 2012 UK census

	Males	Females	Total
0-4	201	158	359
5-9	1,110	1,068	2,178
10-14	4,360	4,386	8,746
15-19	4,847	4,944	9,792
20-24	4,200	4,642	8,841
25-29	5,544	7,346	12,891
30-34	8,322	9,767	18,089
35-39	8,718	9,474	18,192
40-44	6,510	7,291	13,801
45-49	4,676	5,580	10,257
50-54	3,958	4,851	8,809
55-59	2,793	3,450	6,243
60-64	1,544	2,023	3,567
65-69	839	1,079	1,919
70-74	460	681	1,142
75+	487	803	1,290
Total	58,570	67,547	126,117

Table A. 8: Standardised estimates of the net migration rates per 1000

	1992-2002				2002-2012			
	IHME	ZIM CENSUS	WPP	DESA	IHME	ZIM CENSUS	WPP	DESA
0-4	-184	-24	-25	-3	-99	-17	-25	-9
5-9	-118	-7	-9	-2	-89	-9	-13	-8
10-14	-93	-81	-10	-7	-73	-50	-14	-20
15-19	-149	-145	-41	-18	-178	-202	-60	-73
20-24	-181	-182	-91	-30	-239	-248	-131	-114
25-29	-148	-191	-119	-33	-174	-192	-148	-88
30-34	-100	-114	-94	-39	-100	-83	-79	-83
35-39	-70	-62	-81	-37	-52	44	-52	-62
40-44	-7	-3	-67	-29	-3	85	-46	-35
45-49	47	97	-55	-34	74	189	-41	-38
50-54	20	-21	-40	-26	112	148	-29	-22
55-59	-32	-112	-38	-34	103	50	-25	-28
60-64	43	-8	-26	-24	139	90	-19	-16
65-69	147	-49	-27	-24	100	25	-18	-15
70+	30	239	-19	-16	-29	302	-16	-17
Totals	-59	-37	-40	-31	-95	-55	-53	-45