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Mid-year population estimates

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Acronyms and abbreviations

AIDS	acquired immune deficiency syndrome
AIM	AIDS Impact model
ANC	antenatal care
ART	antiretroviral therapy
CBR	crude birth rate
CDR	crude death rate
COVID-19	coronavirus disease 2019
DemProj	Demographic projections
DHA	Department of Home Affairs
HIV	human immunodeficiency syndrome
IMF	International Monetary Fund
IMR	infant mortality rate
IOM	International Organisation for Migration
NDoH	National Department of Health
NPR	National Population Register
NSO	National Statistical Organisation
OECD	The Organisation for Economic Co-operation and Development
PMTCT	prevention of mother-to-child transmission
PLWHIV	People living with HIV
RAPID	Rapid Mortality Surveillance
RNI	rate of natural increase
SDDS	Special Data Dissemination Standards
Stats SA	Statistics South Africa
TFR	total fertility rate
U5MR	under-five mortality rate

Definition of concepts

Age-specific fertility rate (ASFR) – The age-specific fertility rate measures the annual number of births to women of a specified age or age group per 1 000 women in that age group.

Annual growth rate (GR) – The rate at which the population is increasing or decreasing in a given year due to natural increase and net migration, expressed as a percentage of the base population.

Cohort component projection – A projection made by subjecting all cohorts, on an annual or five-year basis, to mortality and migration assumptions, and applying fertility assumptions to women of reproductive age.

Crude birth rate (CBR) – The number of live births per 1 000 population in a given year.

Crude death rate (CDR) – The number of deaths per 1 000 population in a given year

Epidemic – A disease that affects a large number of people within a community, population or region.

Excess deaths – The number of deaths observed during the pandemic above a baseline of recent trends

Life expectancy (e(0)) – The average number of years a new-born can expect to live based on the mortality conditions at the time.

Life table – A table of values based on a series of related functions having to do with survivorship over intervals of time.

Pandemic – An epidemic that has spread over multiple countries or continents.

Population projection – Computations depicting the future course of a population's size, its structure, and its interaction with dynamics such as fertility, mortality, and migration. The projection is constructed based on assumptions about the future course of those population dynamics.

Rate of natural increase (RNI) – The rate at which the population is increasing or decreasing in a given year due to the surplus or deficit of births over deaths, expressed as a percentage of the base population.

Sex ratio – The number of males per 100 females in a population.

Total fertility rate (TFR) – The average number of children that would be born alive to a woman (or a group of women) during her lifetime if she were to pass through all her childbearing years conforming to the age-specific fertility rates of a given year.

Under five-mortality rate (U5MR) – The number of deaths to children under the age of five per 1 000 live births

Summary

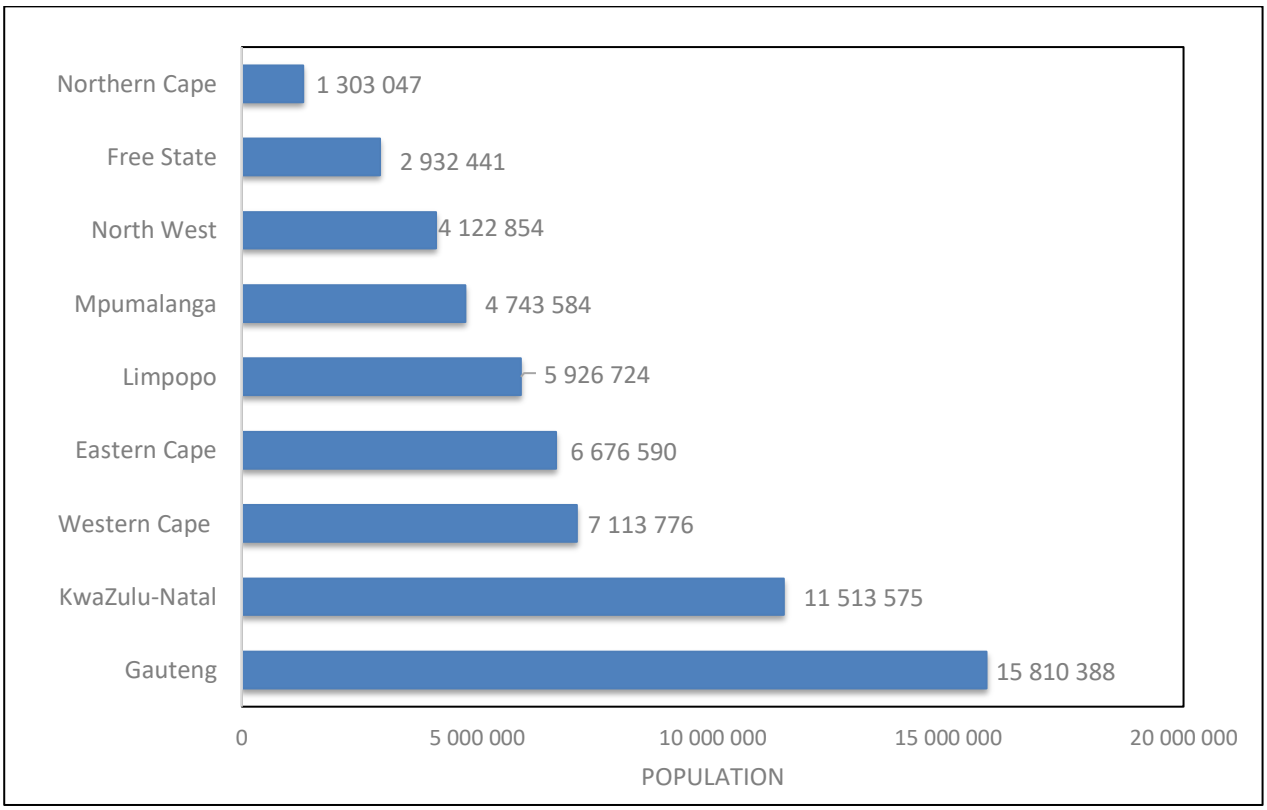
- The cohort-component methodology is used to estimate the 2021 mid-year population of South Africa.
- The estimates cover all the residents of South Africa at the 2021 mid-year point, and are based on the latest available information. Estimates may change as new data become available. The updated estimates are accompanied by an entire series of revised estimates for the period 2002–2021. On this basis, comparisons between this model and previous ones should not be made.
- For 2021, Statistics South Africa (Stats SA) estimates the mid-year population at 60,14 million people.
- Approximately 51,1% (approximately 30,75 million) of the population is female.
- On 5 March 2020, South Africa recorded its first case of COVID-19. By the 11th of March, the World Health Organisation (WHO) declared COVID-19 a global pandemic. South Africa's first COVID-19 related death occurred on 27th March 2020. As the spread of the disease occurred over time, there was a rise in the number of direct and indirect deaths in the population due to COVID-19. In conjunction, there was a rise in innovation in COVID-19 related treatment protocols, prevention measures and vaccination development over this time.
- Life expectancy at birth for 2021 is estimated at 59,3 years for males and 64,6 years for females.
- The infant mortality rate for 2021 is estimated at 24,1 per 1 000 live births.
- The estimated overall HIV prevalence rate is approximately 13,7% among the South African population. The total number of people living with HIV (PLWHIV) is estimated at approximately 8,2 million in 2021. For adults aged 15–49 years, an estimated 19,5% of the population is HIV positive.
- There is a reduction in international migration, which is indicative of the COVID-19 travel restrictions and subsequent impact on migratory patterns since March 2020. Migration is an important demographic process, as it shapes the age structure and distribution of the provincial population. For the period 2016–2021, Gauteng and Western Cape are estimated to experience the largest inflow of migrants of approximately, 1 564 861 and 470 657 respectively.
- Gauteng still comprises the largest share of the South African population, with approximately 15,81 million people (26,3%) living in this province. KwaZulu-Natal is the province with the second largest population, with an estimated 11,5 million people (19,1%) living in this province. With a population of approximately 1,30 million people (2,2%), Northern Cape remains the province with the smallest share of the South African population.
- About 28,3% of the population is aged younger than 15 years (17,04 million) and approximately 9,2% (5,51 million) is 60 years or older. Of those younger than 15 years of age, the majority reside in Gauteng (21,8%) and KwaZulu-Natal (21,2%). The proportion of elderly persons aged 60 years and older in South Africa is increasing over time and as such policies and programs to care for the needs of this growing population should be prioritised

Table 1: Mid-year population estimates for South Africa by population group and sex, 2021

Population group	Male		Female		Total	
	Number	% distribution of males	Number	% distribution of females	Number	% distribution of total
Black African	23 761 051	80,9	24 879 278	80,9	**48 640 329**	**80,9**
Coloured	2 578 930	8,8	2 716 038	8,8	**5 294 968**	**8,8**
Indian/Asian	790 412	2,7	754 810	2,5	**1 545 222**	**2,6**
White	2 257 654	7,7	2 404 805	7,8	**4 662 459**	**7,8**
Total	**29 388 047**	**100,0**	**30 754 931**	**100,0**	**60 142 978**	**100,0**

**Due to rounding totals may not add up to 100%*

Figure 1: Mid-year population estimates for South Africa by province, 2021



1. Introduction

In a projection, the size and composition of the future population of an entity such as South Africa is estimated. The mid-year population estimates produced by Statistics South Africa (Stats SA) uses the cohort-component method for population estimation. In the cohort-component method, a base population is estimated that is consistent with known demographic characteristics of the country. The cohort base population is projected into the future according to the projected components of change. Selected levels of fertility, mortality and migration are used as input to the cohort-component method. For the 2021 mid-year estimates, the cohort-component method is utilised within the Spectrum Policy Modelling system. Spectrum is a Windows-based system of integrated policy models (version 6,08). The DemProj (Demographic Projection) module within Spectrum is used to develop the demographic projection, whilst the AIDS Impact Model (AIM) is used to incorporate the impact of HIV and AIDS on fertility and mortality, and ultimately the population estimates. Within the DemProj, a COVID-19 editor allows for the inclusion of COVID-19 related deaths by age and sex to be incorporated into the model. Spectrum requires annual estimates regarding births, deaths, and migration, among other indicators. The population estimates produced aim to take into account the impact of COVID-19 on births, deaths and migration. The impact of COVID-19 on demographic processes is discussed in detail throughout the report.

Stats SA subscribes to the specifications of the Special Data Dissemination Standards (SDDS) of the International Monetary Fund (IMF). This standard dictates that the MYPE release should be disseminated within one month of the mid-year. The mid-year estimates are an estimate of the population as at 30 June in a given year. The estimates of stock such as population size, number infected with HIV etc. pertain to the middle of the year i.e. 30 June, whilst the estimates of flow e.g. births, deaths, Total Fertility Rates (TFRs), Infant Mortality Rates (IMRs) etc. are for a 12-month period e.g. 1st July 2020 to 30th June 2021. A stock variable is measured at a given time, and represents a quantity at each moment in time – e.g. the number of people within the population at a certain moment whilst an estimate of flow is typically measured over a certain interval of time. The mid-year population estimates are published annually. It would be misleading to compare values and rankings with those of previously published reports, due to revisions and updates of the underlying data and adjustments. Users are advised to use the complete series, published along with this report on the StatsSA website.

2. Demographic and other assumptions

The purpose of the mid-year population estimates and projections is the task of determining the demographic profile of the country so as to better assist with planning as it relates to health, economics and welfare. A cohort-component projection requires a base population distributed by age and sex. Levels of mortality, fertility and migration are estimated for the base year and projected for future years. The cohort base population is projected into the future according to the projected components of population change.

3. Fertility

The DemProj module of Spectrum is used to produce a single-year projection, thus the TFR and the life expectancy at birth must be provided in the same format i.e. annually. The time series of TFR estimates for all population groups in South Africa are derived following a detailed review of TFR estimates (1985–2021), published and unpublished, from various authors, methods and data sources.

The impact of COVID-19 on conception and subsequently the expected births in 2021 is anticipated to decline given the escalation in economic uncertainty. Literature has shown that in times of economic downturn people become more risk averse (Adsera, 2011; Goldstein et al, 2013; Matysiak et al, 2021; Vignoli et al, 2019). Matysiak et al (2021) indicate that among the economic indicators influencing fertility, unemployment and the deterioration of the labour market is shown to be associated more so with negative fertility dynamics. In South Africa the unemployment rate increased by 1,7% in the fourth quarter of 2020 (32,5%) when compared to the fourth quarter of 2019 (29,1%)(pre COVID-19) (Stats SA, 2021(a)). Orsal and Goldstein (2010) in their study of 22 developed countries, found a negative impact on immediate fertility with higher unemployment among men and women. These effects may be temporal resulting in postponement of birth and having greater influence on first births. Few studies however in Africa have demonstrated the impact of recession and unemployment on fertility, including South Africa. Studies investigating the fertility intentions in Europe and United Kingdom post COVID-19 have indicated most women in childbearing ages deciding to postpone their first birth (Luppi, Arpino & Rosina, 2020; Sobotka, et al., 2021). Along with decreased job security, family routines around domestic work, childcare, school supervision and other stressors have shown to sway women to further delay births post COVID-19 (Lewis, 2020; Berrington, 2020). The lockdown measures themselves have also inadvertently prevented physical contact and as a result delaying or even limiting possible pregnancy in the short term.

Whilst the aforementioned factors are likely to result in a decline in fertility due to the COVID-19 pandemic, there are factors brought about during the COVID-19 pandemic that increase the likelihood of increased births. Past experiences with infectious diseases such as influenza and even HIV has shown that there has been a reaction of high fertility to high levels of mortality. However, these historical experiences of epidemics and shocks should be understood within the context of their time. The influenza resulted in deaths among all ages, disproportionately among young adults although infants and children were also affected, at a time when children were valued for labour (Reid, 2005). High infant deaths were followed by higher compensating birth rates; however, contraceptive methods were not as readily available as they are now. The age specificity of the mortality pattern due to COVID-19 is such that those at older ages and those with co-morbidities are at higher risk of death. Anticipation of higher birth rates post COVID-19 based on such past epidemics may be unrealistic (Aassve et al; 2020).

Health professionals and planners are rather more concerned with the impact of the lockdown measures due to COVID-19 on the rollout of sexual and reproductive health services such as access and uptake of contraceptive methods, prenatal care provided to mothers, rollout of ARTs and early treatment and diagnosis of diseases and illnesses. Collateral impacts of this nature are also likely to occur due to the constraints on or overburdening of the health care system due to COVID-19 resulting in higher births. Similarly, there is a

concern that adolescent pregnancies may rise due to the hampering of sexual and reproductive program and campaigns due to COVID-19. A study by the Human Sciences Research Council (HSRC) showed a rise in adolescent pregnancies (Shisana et al., 2012), while Mchunu and others (2012) also show high adolescent pregnancies in their sample. These may likely continue given the collateral impact of COVID-19 as well as the closure of schools for extended periods. Stone et al. (2020) indicate that past experience of economic and environmental stressors have resulted in short term decline of births followed by a recovery period when such stressors have been addressed.

Given the array of possible and plausible outcomes for fertility in South Africa given the impact of COVID-19, the MYPE team has chosen to opt to assume a constant decline in births over time (post -009) (Aassve et al.; 2020). Empirical data to the actual effect will only be reflected in the recorded live birth occurrences and registration of 2021 and beyond (9 months after the pandemic). For this reason, current assumptions of national and provincial fertility are based on trends seen in published births data currently available at national and provincial level (Stats SA, 2015; Stats SA, 2020a). The finalised TFR assumptions can be found in Table 2 (page 7). The estimates of fertility show a fluctuation over the period 2002–2021, giving rise to a population structure indicative of that of the Census 2011 population structure. Between the period 2009 and 2021, fertility has declined from an average of 2,62 children per woman to 2,31 children in 2021. Other inputs required in DemProj include the age-specific fertility rate (ASFR) trend and sex ratios at birth.

4. Mortality

The ultimate purpose of the mid-year population estimates, which is to assist with policy making and planning based on the population structure and profile, cannot be addressed without taking into account the COVID-19 pandemic that has greatly affected the nation over the past sixteen months. On 5 March 2020, South Africa recorded its first case of COVID-19. By the 11th of March, the WHO declared COVID-19 a global pandemic. South Africa's first COVID-19 death occurred on 27 March 2020. By 1 July 2020, approximately 152 000 confirmed COVID-19 infection cases and 2 700 confirmed COVID-19 related deaths were reported in South Africa (NDoH, 2020). COVID-19 reported cases and deaths, during the early days of the epidemic were always cautioned with a preface that such estimates may be hampered by definitional inconsistencies, logistical issues and general aspects that come with attempting to count whilst also researching a relatively unknown pandemic with unclear testing, monitoring and classification processes at the time. It was clear that this was an underestimation.

Working retrospectively to determine COVID-19 related deaths is not a simple task. The Medical Research Council (MRC) has over time, prepared weekly publications indicating excess deaths in South Africa encountered during the pandemic. The report is based on deaths captured in the National Population Register (NPR) of South Africa (Dorrington et al., 2021). The MRC estimates the mortality impact of COVID-19 to be three-fold what was reported by NDoH for the 4-month period March 2020 to June 2020 (Dorrington et al., 2021; NDoH, 2020; Moultrie, 2021). Using all-cause deaths reported in the death registration system of South Africa (adjusting for late registration and incompleteness), the MRC developed estimates of excess deaths experienced during the COVID-19 pandemic (Dorrington et al., 2021). Excess deaths refer to the number of deaths observed during the pandemic above a baseline of recent trend (Dorrington et al., 2021; NDoH, 2020).

Despite the rise in excess deaths since the start of the pandemic to 30th June 2020, these numbers were marginal in comparison to all cause annual deaths for the period 1st July 2019–30th June 2020 (based on published Stats SA, 2020b). The indicators produced as well as the input data required in the MYPE are annual figures i.e. 1st July 2019–30th June 2020. As such the demographic impact of direct and indirect COVID-19 deaths on population estimates for the year 2020, were marginal. In contrast, between 1st July 2020 and 30th June 2021, two waves of the pandemic swept across the country (Bradshaw et al., 2021) and by the 11th June 2021, NICD was reporting that the country had technically entered a 3rd wave. South Africa, as with many other countries, experienced the mutation of the COVID-19 virus (beta), which resulted in a higher level of COVID-19 infections and consequently higher COVID-19 mortality in the population (NICD, 2021). The first two waves of the pandemic in South Africa and subsequently the current third wave of the pandemic has proved the health care system in South Africa ill prepared to deal with the burden of high COVID-19 infection and morbidity. The second wave of the epidemic (larger than the first) overwhelmed hospitals and medical staff (NICD, 2021; Dorrington et al., 2021). These waves resulted in significantly higher proportions of deaths in the country.

To estimate the population in the DemProj model in Spectrum, age and sex specific death rates are required. The age, sex and geographic profile of deaths for all residents in South Africa for the period 2019–2021 are yet to be published by Statistics South Africa (Stats SA, 2020e). The South African Medical Research Council (SAMRC) have published weekly excess deaths. The published deaths have been adjusted for non-citizenship, late registration and completion in their estimation. Internationally, measures of excess deaths indicate that the COVID-19 pandemic substantially increased mortality in 2020 and 2021 in many countries (Kalinsky and Kobak, 2021; Aburto et al., 2021). The age mortality profile of the disease indicates that older people and those with co-morbidities specifically diabetes and hypertension, face a higher risk of mortality (Biswas, et al., 2020, Booth et al., 2021; Sanyaolu et al., 2020; Pillay et al., 2020; Goldstein and Lee, 2020). However, broader categories of respiratory diseases, circulatory diseases and cancer also face higher risk of mortality (Sanyaolu et al., 2020; Stokes et al., 2020, Biswas et al., 2020; Booth et al., 2021; Pillay et al., 2020).

By the end of June 2021, the South African Medical Research Council (SAMRC) estimates that only a third of excess deaths occurring since March 2020 have been reported by the National Department of Health (NDoH) (Moultrie et al., 2021). The data published by the NDoH are limited to direct COVID-19 cases and deaths occurring in public and private hospitals in South Africa. It is evident that deaths counted in private and public hospitals during a pandemic do not accurately reflect the mortality rates due to COVID-19 in the country. In addition, collateral deaths arising from constraints on, or overburdening on the health care system due to the COVID-19 pandemic, are often not accounted for in the impact of COVID-19, locally and globally. According to Sasson (2021), data from the Organisation for Economic Co-operation and Development (OECD) and high income countries indicate that differences in population health, standards of clinical care, readiness of healthcare systems, or data quality and reporting practices of COVID-19 deaths leads to differences in the age pattern of COVID-19 mortality (Carincini, 2020, Pasquariello & Stranges, 2020, Kang & Jung, 2020). It is clear that age specific mortality rate should be examined, bearing in mind the demographic and health context of each country. According to Bradshaw et al., (2021), it is estimated that more than 180 000 excess deaths have occurred since the beginning the COVID-19 pandemic in South Africa. Almost 85% of excess deaths can be attributed to the COVID-19 pandemic (Moultrie et al., 2021). Given the various constraints in measuring the

number of COVID-19 direct and indirect deaths, all-cause mortality is used to quantify the burden of the pandemic (Kalinsky and Kobak, 2020, Aburto et al., 2021, Dorrington et al., 2021).

There have been moments in South African history whereby age-sex specific death rate patterns have been affected by a breakout of illness and disease. In 1918, South Africa was among the top five countries hardest hit by the Spanish flu (Phillips, 2012). Polio, TB, and Malaria also took its toll on the health care system and the South African population (Stats SA, 2020b). More recently, the HIV pandemic, at its peak in 2006, contributed to almost 40% of all deaths in the country (Simbayi et al., 2019). AIDS-related deaths have remained prevalent in South Africa for more than 2 decades. Due to the age-sex specific profile of AIDS-related death rates and its subsequent impact on the population structure of South Africa, HIV estimation has remained part of the mid-year population estimation modelling. There are differences in both the nature and experience of the AIDS and COVID-19 pandemics. The far more infectious COVID-19 virus, spread via droplets or aerosols, greatly affected the entire globe, with deaths rates sparing no country including developed populations (Booth et al., 2021; Sanyaolu et al., 2020; Pasquariello & Stranges, 2020). In contrast, the highest HIV infection and AIDS-related mortality are found in poorer countries with the epicentre being Africa (Simbayi et al., 2019; Gona et al., 2020). In Africa, the primary mode of transmission is via sexual transmission, with highest infection and deaths rates among youth, adult and female population as well as infants born with the infection (Simbayi et al., 2019). Research and development into the AIDS pandemic has taken place over two decades and whilst life-saving drugs have become available, these are life-long regiments. Due to the nature of the disease, to date no HIV vaccine has been achieved. Vaccine development to address the COVID-19 pandemic has taken place in record-breaking time, building on the achievements in the study of viruses and disease globally. However, the mutations of the virus over time continue to threaten the impact of those achievements.

Whilst it is imperative to take cognisance of the public health issues occurring within the country, population estimation models do not require cause specific deaths. The estimation model is reliant on age and sex specific death rates occurring at various levels of geography to provide an age-sex structure incorporating the overall mortality of the country (all-cause mortality). In South Africa, the relative risk of COVID-19 mortality is higher for men than women (NICD, 2021, Pillay et al., 2020). Excess deaths in the peak of the second wave of the COVID-19 pandemic quadrupled among those aged 60 and older (Dorrington et al., 2021). The age and sex structure of direct confirmed COVID-19 deaths found in hospitals in South Africa follow a similar pattern found internationally with some variability. In the absence of current empirical data regarding the age and sex structure of excess deaths by population group, estimated excess deaths occurring in MYPE for the year 1st July to 30th June will be disaggregated using a combination of the age-sex structure found in hospitals as well as the age distribution of deaths found in the NPR (Dorrington et al., 2021; NICD, 2021). As such, the population age and sex structure published in this report will incorporate the mortality experience of COVID-19 annually.

We acknowledge that the difference in age and sex structure of reported deaths in the hospital system as well as those evident in the NPR may hold particular age; sex; population group; geographic and reporting biases that we are yet to uncover. In the absence of current empirical data regarding the age and sex structure of

COVID-19 distributed by population group, a similar assumption has been made using hospital and registration data currently available. The MYPE is updated annually, and will be revised to incorporate new information including the Mortality and Causes of Deaths data when made available or published.

Using excess deaths, we can determine the impact of the pandemic on life expectancy across countries (Goldstein and Lee, 2020). Internationally we have already seen a decline in life expectancy at birth between 2019 and 2020 in 25 of the 27 countries for which there is high quality vital statistics on death available (Aburto et al., 2021). Life expectancy for 2020 is estimated to have declined between 2 to 3 years in the United States (Aburto, 2021, Lee and Goldstein, 2020). In England and Wales, life expectancy at birth has been estimated to decline by 0,9 year for women and 1,6 years men (Aburto et al., 2021). It is clear that in developing countries devastated by the COVID-19 pandemic, reversals in life expectancy due to the COVID-19 pandemic are likely to be greater (Karlinsky and Kobak, 2020, Aburto et al., 2021, Goldstein and Lee, 2020).

Life expectancy at birth is a commonly used indicator of health and development in a country. Reversals and stagnation in life expectancy in South Africa due to the HIV pandemic was a result of mid-life and infant mortality crisis. The HIV/AIDS pandemic is a two-decade long public health issue that has greatly affected the demography of South Africa. The life expectancy measure, whilst useful in the context of HIV/AIDS, can actually overstate the impact of a temporary epidemic mortality (Goldstein and Lee, 2020; Heuveline, P. and Tzen, M., 2021). Life expectancy at birth is an important health indicator and should not be discredited by potentially misleading interpretations (Luy et al., 2019). The key advantage of this indicator is gained when comparisons are made over time and across countries with different population sizes and structures. The indicator is sensitive to ages at which deaths occur. Similar to the HIV pandemic, the derived life expectancy at birth during the COVID-19 pandemic is affected by the selection effect of COVID-19 deaths i.e. older persons and those with comorbidities face higher mortality (Levin et al., 2020; Sanyaolu et al., 2020; Pillay et al., 2020). The indicator should not be interpreted as a projection of an individual's lifespan but rather should be used to shed light on the cumulative burden of a crisis such as COVID-19 compared to recent trends (Aburto et al., 2021, Luy et al., 2019, Goldstein and Lee, 2020). The indicators of mortality soared to their highest levels in a matter of weeks with waves of deaths occurring over short intervals (Luy et al., 2019). Bearing in mind the sensitivity of the indicator to cohort, heterogeneity and temporal effects, it is imperative that additional alternative indicators of mortality such as crude death rate, infant and child mortality are considered in the interpretation of health and wellbeing in the country (Luy et al., 2019, Goldstein and Lee, 2020; Heuveline, P. and Tzen, M., 2021).

The life expectancy assumption entered into DemProj by sex is the life expectancy in the absence of HIV/AIDS (see Table 2). Each population group is subjected to non-AIDS mortality according to the input non-AIDS life expectancy and the selected model life table. AIM calculates the number of AIDS deaths and determines a new set of life expectancies that incorporate the impact of AIDS, (see Figure 3, page 13). Stats SA applies the country-specific UN Model Life table for South Africa in Spectrum. The age pattern of mortality is based on various sources, data and methods – these include death data from the RAPID mortality surveillance report, Mortality and causes of death report, and the Demographic and Health Survey report – among others. Survival

rates from the selected life tables were then used to project the population forward. Additionally, excess deaths in the time of COVID-19 pandemic is incorporated into the estimation process.

Table 2: Assumptions of Total Fertility rate and expectation of life at birth without HIV/AIDS & COVID-19, 2002–2021

Year	TFR	Life expectancy at birth without HIV/AIDS	
		Male	Female
2002	2,45	59,9	67,2
2003	2,42	59,8	67,9
2004	2,54	60,0	68,1
2005	2,59	60,0	68,1
2006	2,63	60,0	68,2
2007	2,65	60,3	68,2
2008	2,66	60,4	68,2
2009	2,62	60,4	68,3
2010	2,58	61,7	68,4
2011	2,51	62,9	68,9
2012	2,46	63,2	69,4
2013	2,42	63,5	69,9
2014	2,39	63,6	69,9
2015	2,35	63,7	70,2
2016	2,29	63,7	70,2
2017	2,33	64,0	70,5
2018	2,35	64,0	70,5
2019	2,34	64,3	70,7
2020	2,33	64,7	71,3
2021	2,31	64,8	71,3

The Spectrum Policy Modelling System (Futures Group) consists of a number of components that result in the estimation of population size to assist in costing and planning of, and future healthcare services. For the purpose of the production of the MYPE, Stats SA uses two of the available components in this projection model, namely (a) **Demproj** for population projections and (b) **AIM** in which the consequences of the AIDS epidemic were projected. In the AIM projection, several programmatic and epidemiological data inputs specific to South Africa are required. These include programme coverage of adults and children on antiretroviral treatment (ART) and Prevention of mother-to-child-transmission (PMTCT) treatment (NDoH, 2021). In addition to eligibility for treatment as per national guidelines, the epidemiological inputs include antenatal clinic data (ANC). The assumptions regarding the HIV epidemic in South Africa are based primarily on the prevalence data collected annually from pregnant women attending public service antenatal clinics (ANC) since 1990 to the most recent estimates of 2017 (Woldesenbet, S.A, et al., 2018). However, antenatal surveillance data produce biased prevalence estimates for the general population because only a select group of people (i.e. only pregnant women attending antenatal public health services) are included in the sample. The South African

National HIV prevalence, incidence, behaviour and communication survey data that produces national estimates for the country are used in the model to correct for this bias (Shisana et al., 2014; Simbayi et al., 2019). Whilst more recent data on HIV prevalence from such survey post 2017 is not available and as such do not incorporate the impact of COVID-19 on HIV prevalence in the country, treatment data is available and as such programmatic coverage of adults and children on antiretroviral treatment to date has been incorporated into the model (NDOH, 2021). Other inputs in the AIM model include the following: Median time from HIV infection to death, and Ratio of new infections. Indicators of HIV prevalence, incidence and HIV population numbers over time show the impact of HIV on the population. HIV indicators shown in Figures 5 and 6 are based on the aforementioned assumptions.

5. International migration

Between 11 March 2020, when the WHO declared COVID-19 a pandemic, and 22 February 2021, nearly 105 000 movement restrictions were implemented around the world (IOM, 2021). COVID-19 restrictions and protocols, combined with increased logistical burdens around travel, limited the movement of people across international borders. Migration to OECD member countries are estimated to have fallen by an unprecedented 46% in the first half of 2020 (OECD, 2020). These estimates are informed by the number of new immigration permits issued, which only partly represents migration flow (OECD, 2020). Furthermore, Illegal migration constitutes a significant proportion of migration, often missed in official estimates, and this varies from country to country (IOM, 2019). Given the far-reaching impact of an infectious disease such as COVID-19 on travel and movement, it is only rational to expect migration to decline globally. However, the pace and level of that decline over time is somewhat more difficult to predict. Over time, travel restrictions have been amended and protocols revised, to facilitate mobility and migration. Travel restrictions and protocols brought about by the COVID-19 pandemic vary significantly from country to country. The impact of COVID-19 protocols, policies as well as movers' decision-making in the time of a pandemic, has been documented in countries with current and better quality migration data. Germany has seen zero growth in population due to declined immigration, whilst Australia has experienced a negative growth in population for the first time since 1945. Similarly, New Zealand has estimated a 78% decline in migrants entering the country since February 2020 (Stats NZ, 2021). Australia's international migration statistics indicate there were an estimated 200 240 South Africans who had migrated to Australia, as at 30 June 2020. This was an increase from 193 864 people from the year ending 30 June 2019 (ABS, 2021). The data for 2020 includes partial data for when COVID-19 pandemic was present. According to the United Kingdom's office for national statistics, there were about 255 000 South Africans living in the UK in 2019 and this declined by about 26 000 to 229 000 in 2020 (ONS, 2020). Countries that are known to be South Africans' preferred destination of emigration (outside of Africa), have reported an overall decline in the proportions of immigrants entering those countries (ABS, 2021, Stats NZ, 2021, ONS, 2020, OECD, 2021).

Similar to other countries around the globe, South Africa, under the Disaster Management Act of SA called for the closure of South African international borders (during lockdown level 5). This was enacted on 26 March 2020 for a period of 21 days, and further extended by two more weeks. A significant proportion of the South African international migration outside of Africa are facilitated by air travel, primarily to countries such as the USA, Canada, European countries, Australia, and New Zealand, India, Bangladesh, Pakistan, China – and

this significantly was impacted by limits on air travel (Census 2011, CS 2016). Although international borders were closed, evacuation of non-citizens back to their countries of origin as well as repatriation of citizens returning to South Africa was allowed. Given the aforementioned developments, MYPE 2021 series assumes a decline in international migration for the period April, May and June 2020. The MYPE provides annual estimates of migration for the period 1st July to 30th June, as such the change in migration, for the period 20 March 2020 to end June 2020 (just over 3 months), accounts for less than a third of the migration for that year. The organogram (Figure 2), provides a timeline of the changes in lockdown levels in South Africa and the corresponding travel and border closures in South Africa.

The South African Department of Home Affairs (DHA) office routinely collects data on travellers using official ports of entry coming into, and leaving South Africa. This data may be useful in elucidating patterns of international movements in SA and is used to develop migration estimates. According to latest data by DHA immigration officers at ports of entry into South Africa, foreign travellers arriving into SA decreased by 88,8% in February 2021 when compared to February 2020, whilst departures from the country decreased by 89,3% when comparing February 2020 to February 2021 (Stats SA (b), 2021). By March 2021, there had been improvement in mobility, and this may be attributed to the easing of international lockdown measures over time. Foreign travellers arriving into SA decreased by 74,2%, whilst departures from the country decreased by 78,7% when comparing March 2020 to March 2021 (Stats SA (c), 2021). It should be noted that both July 2020 and August 2020 reflect the highest drop in both arrivals and departures, when compared to 2019, this is a direct result of renewed lockdown measures due to the 2nd wave of the COVID-19 pandemic in the country (Stats SA (d), 2021).

Figure 2: Lockdown levels and migration

Level 5	Level 4	Level 3	Level 2	Level 1	Adjusted Level 3	Level 1	Level 2	Level 3	Adjusted Level 4
26-March-30 April 2020	01-31 May 2020	01 June-17 August 2020	18 August-20 September 2020	21 September-28 December 2020	29 December 2020-28 Feb 2021	01 March - 31 March 2021	1 June -15 June 2021	16 June - 27 June 2021	28 June - 30 June 2021

INTERNATIONAL AND NATIONAL BORDER MOVEMENT						
Level 5	**Level 4**	**Level 3**	**Level 2**	**Level 1**	**Adjusted Level 3**	**Adjusted Level 4**
All borders of the country remain closed except for transportation of good and repatriation of citizen to SA and non-citizens to their countries of citizenship Interprovincial travel is not permitted except to return to work with proof of employment; for movement of learners, with permit; in exceptional circumstances such as funerals (with approval) or essential services	All border of the country remain closed except for transportation of good and repatriation of citizen to SA and non-citizens to their countries of citizenship Interprovincial travel is not permitted except to return to work with proof of employment; for movement of learners, with permit; in exceptional circumstances such as funerals (with approval) or essential services	All border of the country remain closed except for transportation of good and repatriation of citizen to SA and non-citizens to their countries of citizenship Interprovincial travel is not permitted except to return to work with proof of employment; for movement of learners, with permit; in exceptional circumstances such as funerals (with approval) or essential services	All border of the country remain closed except for transportation of good and repatriation of citizen to SA and non-citizens to their countries of citizenship All travel between provinces is allowed for any purpose.	Borders reopened for international travel as of 01 October 2020 subject to restrictions. All travel between provinces is allowed for any purpose	Borders reopened for international travel as of 01 October 2020 subject to restrictions. 20 land borders were closed on 11 January 2021 and re-opened on 15 February 2021 while 30 remain closed. All travel between provinces is allowed for any purpose	Borders Remain open Interprovincial travel is restricted when traveling to and form Gauteng only- except work, business or commercial travel however Leisure travel is not allowed.

AVIATION						
Level 5	**Level 4**	**Level 3**	**Level 2**	**Level 1**	**Adjusted Level 3**	**Adjusted Level 4**
Air transport permitted only for the shipment of cargo	Ocean and air transport permitted only for the shipment of cargo	Domestic air travel for business only International flights not permitted	Domestic air travel for business only International flights not permitted	Domestic air travel allowed. International travel allowed as of 01 October 2020.	Domestic air travel allowed. International travel allowed as of 01 October 2020.	Domestic air travel allowed with restrictions to Gauteng). International travel allowed as of 01 October 2020.

Source: www.dha.gov.za

Since 18 April 2021, South Africans were banned from travel to approximately 84 countries (www.skyscanner.com). However, exceptions are made based on purpose of travel. Such restrictions hamper international migration both legal and illegal. Of particular concern to other countries is the presence of the COVID-19 variant (501.V2 now called beta variant), found in South Africa that is far more infectious that the original virus. More recently the spread of the highly transmissible delta variant spreading globally has also lead to renewed restrictions. Whist some countries have fast tracked their vaccination programmes to facilitate local and international travel, by 20 June 2021, only healthcare workers and people aged 60 years and above in South Africa qualified to receive the COVID-19 vaccine.

International borders and international travel opened as of 1 October 2020; however, this was not without interruption and limitations (Figure 2). When the country was in lockdown alert level , no movements in and out of the country was allowed except for transportation of goods and repatriation of South African citizens from overseas and non-South Africans being sent back to their countries of citizenship. In the period 1st July 2020 to 30th June 2021, the country was under alert level 1 lockdown for 5 months (July, August and September 2021 as well as January and February 2021). Taking these lockdown measures into consideration, as well as the factors influencing migrants' ability to migrate and decision-making factors to migrate which include cost of travel, employment opportunities, travel and entry protocols during COVID-19 pandemic, as well as safety issues, international migration estimates for the year 2021 and beyond were revised downwards.

Table 3 shows international migration by population group for selected periods. As already indicated, the impact of the COVID-19 pandemic on international migration for the period 1st July 2019- 30th June 2020 was endured for only a quarter of the year. However, for the period 1st July 2020 to 30th June 2021, assumptions for international migration incorporated impact of COVID-19 for a 12-month period. For the year 2021, the assumption is that international migration remains at a low level given the current situation of effective travel bans, lockdown reactions to surges in infection levels and mutation of the virus, low vaccination rollout numbers globally, worsening economic and employment opportunities, among other factors.

Table 3: International net-migration assumptions for the period by population group, 1985–2021

	African	Indian/Asian	White	Net international migration
1985–2000	632 633	36 908	-202 868	466 673
2001–2006	565 916	25 310	-99 574	491 652
2006–2011	815 780	43 222	-106 787	752 215
2011–2016	972 995	54 697	-111 346	916 346
2016–2021	894 365	49 584	-90 957	852 992

Note: The estimate refers the flow figure from 1st July of the first year in the period to 30th June of the last year of the period

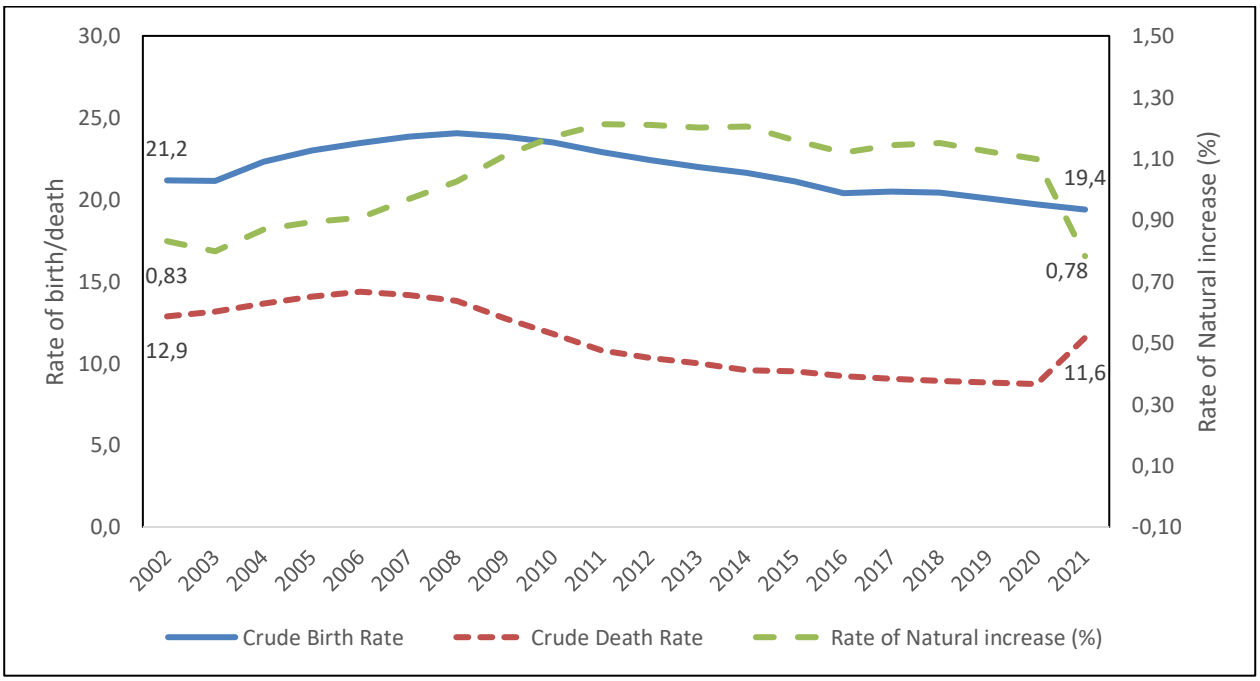
If the net flow of migrants is outward, then net migration is reflected as a negative number whilst if the net flow is inward, then it is reflected as a positive number (Table 3). Net international migration estimates are derived using not only Census 2011 migration data, but also migration numbers and proportions from various other authors, methods and data sources such as the OECD, International Organisation for Migration (IOM), which forms part of the UN network. Census data from National statistics offices (NSOs) of various countries as well as migration data is also sourced**.** Compared to other components of change, the net migration rate can be volatile, as encountered in the recent outbreak of COVID-19 since March 2020.

Projecting international migration post June 2021 is a contentious activity. This is particularly the case at a time when the pandemic and its subsequent treatment unfolds on a daily basis. Unlike the past, whereby trends were stable, the context of a pandemic results in a rather highly variable trajectory. However, as migration data comes to the fore over time, migration assumptions will be revised accordingly.

6. Demographic and other indicators

Figure 2 indicates that the crude birth rate (CBR) has increased between 2003 and 2008, thereafter it follows a general pattern of decline between 2009 and 2021. The CBR is directly related to the rise and fall of TFR assumptions over time (Table 2, page 7). Figures 2–4 and Table 4 offer a glimpse into the mortality experience of South Africa, which incorporates the impact of HIV and AIDS (using the AIM model). The crude death rate (CDR) has declined from 12,9 deaths per 1 000 people in 2002 to 8,7 deaths per 1 000 people in 2020. However, it is clear from the drastic increase in CDR from 8,8 deaths per 1 000 population in 2020 to 11,5 deaths per 1 000 population in 2021, is dramatically influenced by COVID-19 mortality rates in the country within just one year. Due to the AIDS epidemic experience, the crude death rate in South Africa did increase between 2002 and 2006 thereafter declining as access to HIV treatment and care became available. The RNI (rate of natural increase) fluctuates over time, mirroring the CBR in the period 2002 to 2021, indicating the great influence of births relative to deaths over the 10-year period. However with declining fertility and a dramatic increase (34%) in deaths in 2021 due to the COVID-19 pandemic, the rate of natural increase in South Africa dropped drastically from 1,1% in 2020 to 0,8% in 2021.

Figure 3: Crude birth rate, crude death rate, and rate of natural increase over time, 2002–2021



Life expectancy at birth declined between 2002 and 2006, largely due to the impact of the HIV and AIDS epidemic experienced, however expansion of health programmes to prevent mother-to-child transmission as well as access to antiretroviral treatment has partly led to the increase in life expectancy since 2007. By 2021 life expectancy at birth is estimated at 59,3 years for males and 64,6 years for females which is a drop from 2020 where life expectancy at birth was 62,4 years and 68,4 years for males and females respectively, and

this is attributable to the increase in deaths from COVID-19. Figures 4 and 5 indicate that life expectancy was increasing pre 2021. Apart from improved health, education and sanitation over time, the gains may also be related to marginal gains in survival rates due to access to ART among adults over time as well as among infants and children under-5 post 2005. The infant mortality rate (IMR) has declined from an estimated 55,3 infant deaths per 1 000 live births in 2002 to 24,1 infant deaths per 1 000 live births in 2021. Similarly, the under-five mortality rate (U5MR) declined from 74,9 child deaths per 1 000 live births to 30,8 child deaths per 1 000 live births between 2002 and 2021. The IMR and U5MR shown in Figure 4 are based on the selected model life table and may differ to similar indices published elsewhere. Infants admitted to hospitals for COVID-19 related illness experienced a case fatality rate of 6,6% whilst those aged one to four admitted, experienced a case fatality rate of 3,0%. (NICD, 2021 (b)). The children sparing pattern of COVID-19, has thus far made no impact on child mortality levels in the country (NICD, 2021 (b); Kang & Jung, 2020).

The approximately 34% rise in deaths in adults in the year 2021, significantly affected the life expectancy at birth in South Africa. In South Africa, female mortality was already disproportionately higher than male mortality due to the impact of HIV/AIDS (Figure 4). Given there were approximately 8 000 excess deaths estimated for the period 1st July 2019 to 30th June 2020 which is marginal in comparison to overall death count in a given year, there was no significant impact on overall life expectancy. However, in the period 1st July 2020 to 30th June 2021, female life expectancy declined by 3,8 years and male life expectancy declined by 3,1 years. As discussed previously the timeline of the COVID-19 pandemic were such that both the first and second wave of the pandemic occurred between 1st July 2020 and 30th June 2021. Whilst life expectancy and deaths are useful measures of mortality, policy makers should make use of a combination of measures, these include the crude death rate, age specific mortality found within this report, to make more informed decisions for planning purposes when experiencing transitory mortality shocks such as the COVID-19 pandemic (Goldstein & Lee, 2020).

Figure 4: Life expectancy by sex over time, 2002–2021

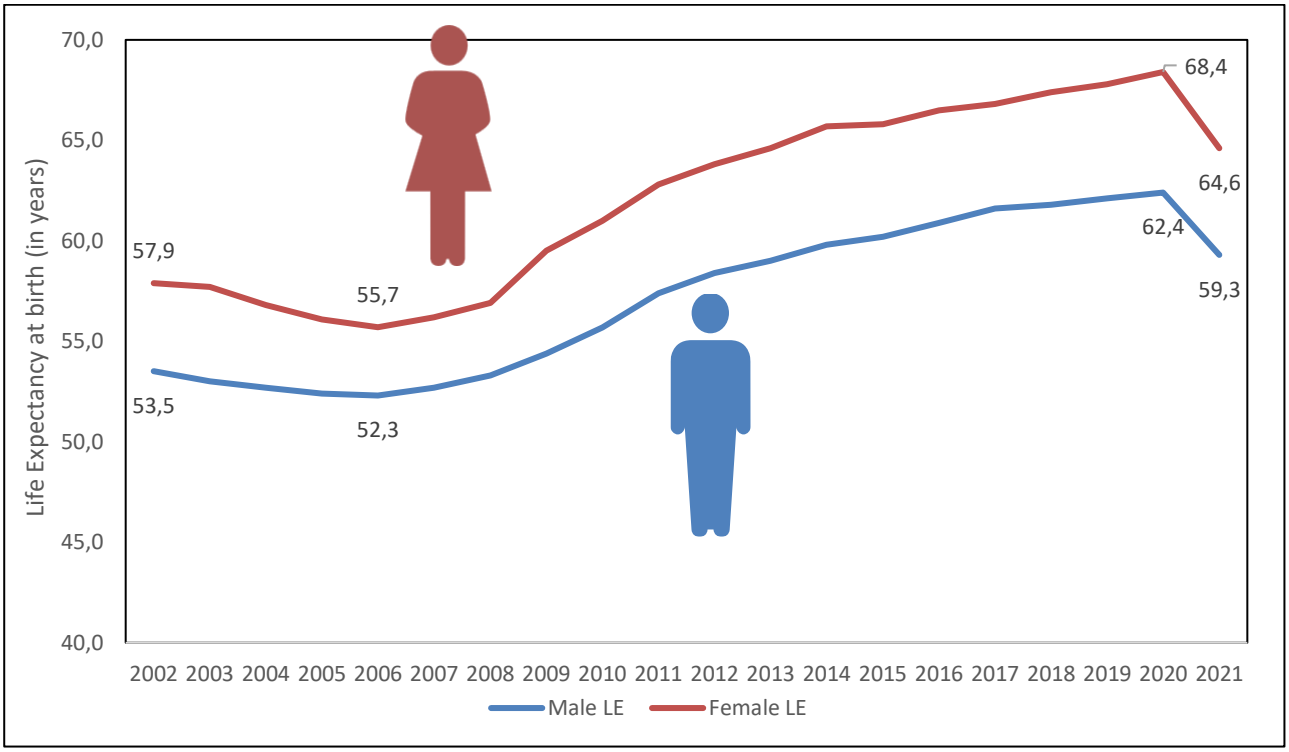


Figure 5: IMR, U5MR and Total Life Expectancy over time, 2002-2021

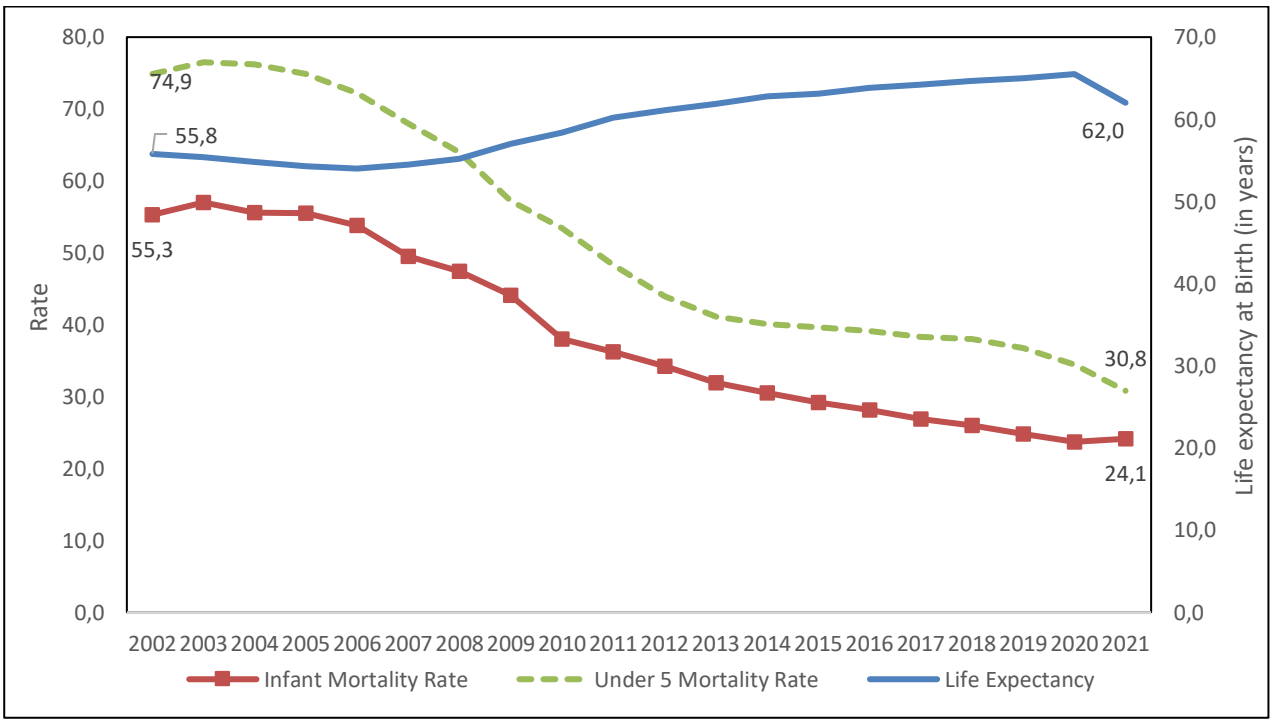


Table 4 indicates estimates for selected indicators. The highest number of deaths was estimated for the period 1st July 2005 to 30th June 2006, during the peak of the AIDS pandemic. The decline in the percentage of AIDS-related deaths since 2006 can be attributed to the increase in the roll-out of ART over time. The national roll-out of ART began in 2005 with a target of one (1) service point in each of the 53 districts of South Africa at the time (later reduced to 52 districts). The estimated number of AIDS-related deaths declined consistently since 2007 from 274 501 to 79 420 AIDS related deaths in 2020 with a slight increase in 2021 to 85 154. Access to antiretroviral treatment has changed significantly over time, altering the pattern of mortality over time. Access to ART has extended the lifespan of many in South Africa, who would have otherwise died at an earlier age, as evidenced in the decline of AIDS deaths post-2006. However, the presence of the COVID-19 pandemic has hampered the ability of the health sector to extend life expectancy in South Africa in the year 2021. A slight increase in AIDS related deaths is apparent in the year 2021, despite efforts to ensure ART rollout and better regiments of treatment (DHIS, 2021). The proportion of AIDS related deaths relative to all deaths declined as the proportion of COVID-19 related deaths increased significantly in the year 2021. Estimated deaths in 2021 come close to levels last seen during the AIDS pandemic at its peak.

Table 4: Births and deaths for the period 2002–2021

Year	Number of births	Number of deaths	Number of AIDS related deaths	Percentage of AIDS related deaths
2002	983 092	596 983	181 497	30,4
2003	991 067	617 135	209 583	34,0
2004	1 057 881	645 841	238 304	36,9
2005	1 102 207	673 977	263 300	39,1
2006	1 137 157	696 827	276 347	39,7
2007	1 171 370	696 160	274 501	39,4
2008	1 196 958	686 582	258 026	37,6
2009	1 203 604	643 045	202 218	31,4
2010	1 203 967	603 347	178 255	29,5
2011	1 192 033	561 381	158 441	28,2
2012	1 184 320	544 956	143 630	26,4
2013	1 179 957	535 678	133 590	24,9
2014	1 177 893	521 005	112 497	21,6
2015	1 167 002	525 739	113 695	21,6
2016	1 145 354	517 030	97 404	18,8
2017	1 168 092	515 722	91 590	17,8
2018	1 182 107	516 635	82 432	16,0
2019	1 178 116	518 613	80 881	15,6
2020	1 173 943	519 865	79 420	15,3
2021	1 166 304	695 913	85 154	12,2

Note: The flow data as shown above are for a 12-month period e.g. 1st July to 30th June

COVID-19 related mortality rate is influenced by a number of factors, which include the spread of the infection; age structure of the population; level and age stratification of co-morbidities in the population as well as the ability of the health system to cope. The drop in life expectancy thus varied quite significantly as such factors unfolded dramatically differently over time and by country. South Africa experienced both the first and second wave of the COVID-19 pandemic in the year 2021 (i.e. 1st July 2020 to 30th June 2021). Assuming greater vaccination coverage, continued prevention practices i.e. mask wearing; social distancing and sanitising of hands and surfaces; further innovation in drug and treatment protocols and the avoidance of a more severe or infectious strain of the virus, we would likely see life expectancy in South Africa revert to previous levels (Haas, et al., 2021). Whilst scientists, epidemiologist, clinicians and various members of the health and science fraternity continue to investigate the origins and possible cure for this global pandemic, governments and policy makers are required to deal with higher levels of mortality and morbidity due to the COVID-19 pandemic. Research on vaccinations has developed in record time; however, logistics of access, rollout and uptake of those vaccinations have contentious problems faced by many countries including South Africa (Kashte et al., 2021). Scientists are already looking to the future in studying the development of booster shots to ensure longer protection against COVID-19 as well as possible variants and mutations. Research into the rise of 'Long COVID', indicates a "multisystem, post viral condition with symptoms including fatigue, anxiety, low mood, cognitive problems, and atypical chest pain stretching over a period of weeks or months without recovery", which inevitably leads to higher levels of morbidity in a population (Booth et al., 2021). It is clear that the impact of COVID-19 is something we will be confronting for some time in the near future.

HIV prevalence

Figures 5 and 6 show the HIV prevalence estimated for the period 2002–2021. For 2021, an estimated 13,7% of the total population is HIV positive. Almost a fourth of South African women in their reproductive ages (15–49 years) are HIV positive. HIV prevalence among the youth aged 15–24 has remained stable over time. The total number of persons living with HIV (PLHIV) in South Africa increased from an estimated 3,8 million in 2002 to 8,2 million by 2021. Having the largest number of people enrolled on ART programme in the world, the South African government was indeed concerned about the impact of COVID-19 on PLWHIV as well as impact on testing and treatment programmes. Efforts to ensure continuity of care among PLWHIV, whilst de-escalating health services to lower the spread of COVID-19 was advocated and promoted by the National Department of Health and various stakeholders in the heath sector (Elsayed et al., 2020). Despite such efforts, supply of medicines are hampered when there is a global pandemic along with global lockdown measures and travel restrictions. ART regimens are lifelong and require continuity. Disruptions in access to treatment protocol can be detrimental to health and wellbeing among HIV positive persons. Studies have indicated that PLWHIV with immunosuppression, do display higher mortality risk due to COVID-19 as multi-morbidity is a constant feature (Mirzaei et al., 2021; Ssentongo et al., 2021), emphasising the imperative need for access to continual treatment. Available data suggests a decline in annual number of clients remaining on ART by approximately 4% (DHIS, 2021). It is clear that the COVID-19 pandemic has to some extent, interrupted HIV prevention and treatment programmes in South Africa as it did globally. Data from public and private hospitals in South Africa

indicate that the case fatality rate (CFR) was higher for HIV infected persons (20,9%) when compared to non-HIV infected persons (18,9%) (NICD, 2021a). The presence of a competing pandemic such as COVID-19 in South Africa does present challenges that are likely to hamper progress to reach annual targets and goals set by the country and international organisations concerned with the eradication of HIV and AIDS (UNAIDS, 2020).

Figure 6: HIV prevalence by selected age groups, 2002–2021

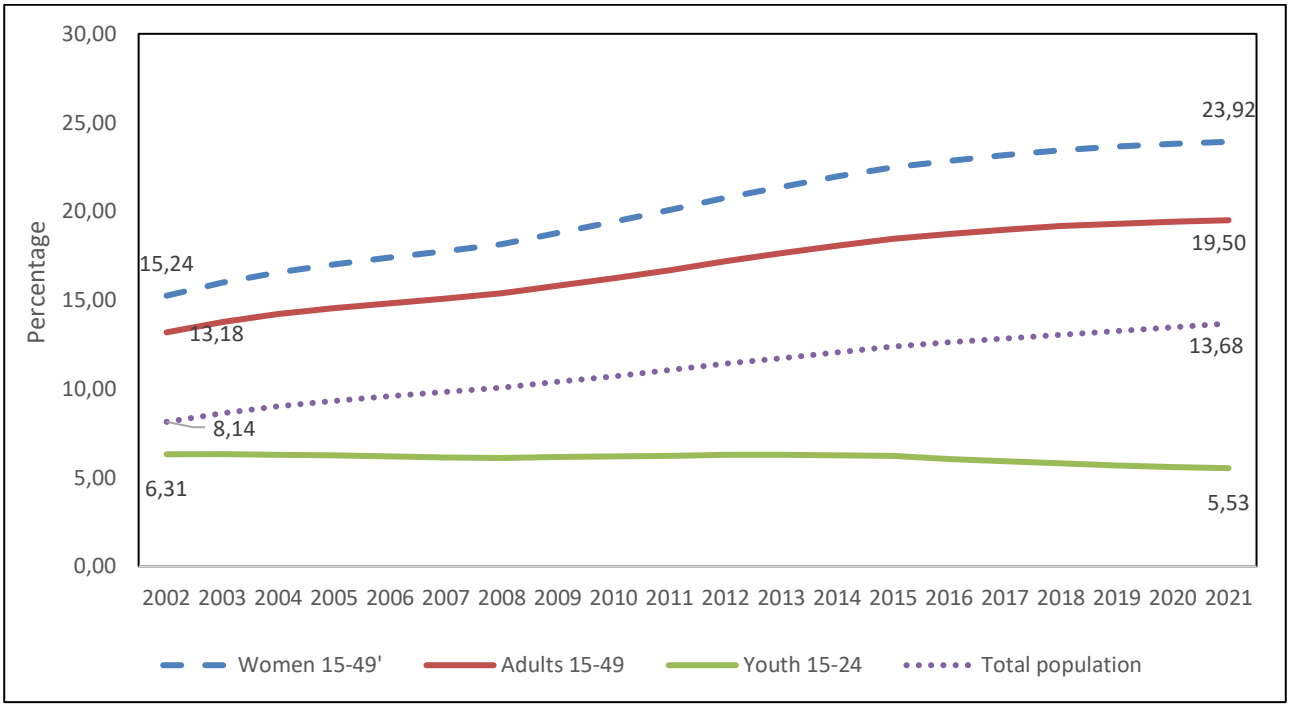
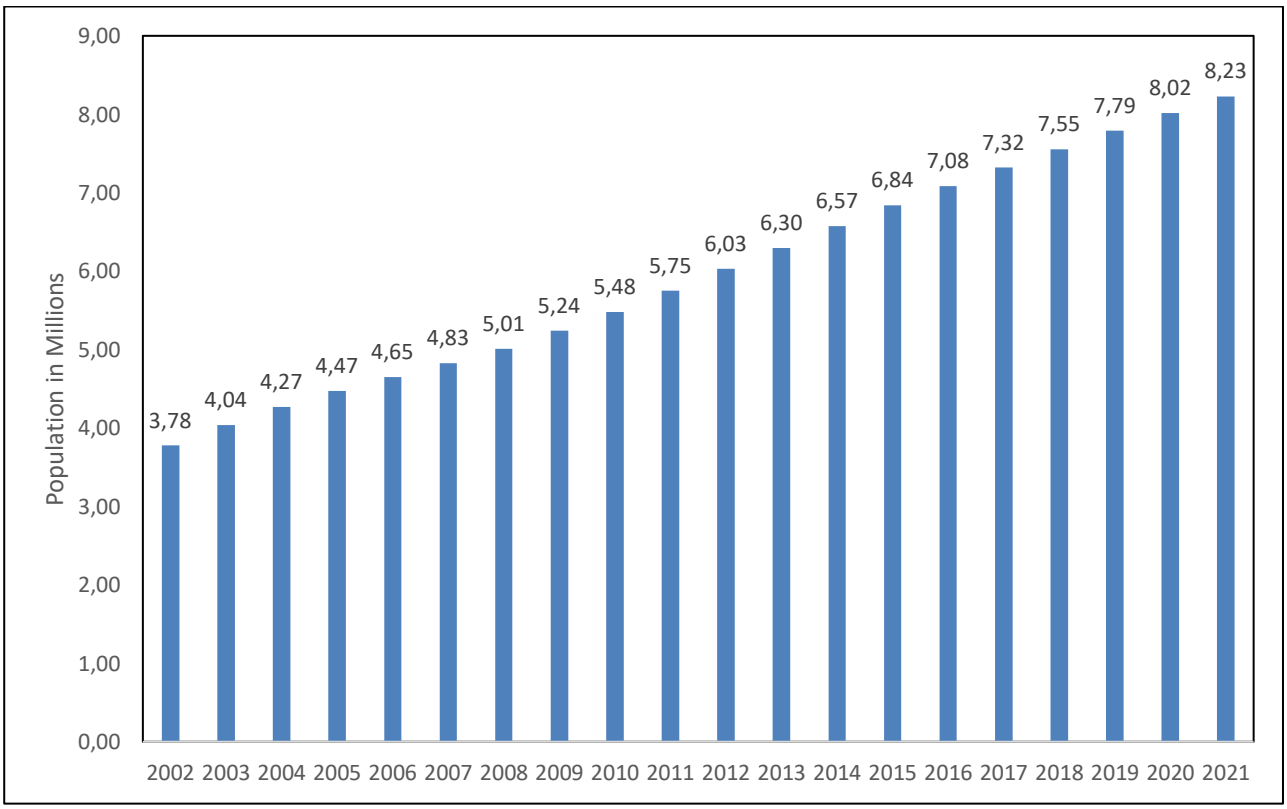


Figure 7: HIV Population over time, 2002–2021



7. National population estimates

Table 5 shows the mid-year population estimates by population group and sex. The mid-year population is estimated at 60,14 million. The black African population is in the majority (48,6 million) and constitutes approximately 81% of the total South African population. The white population is estimated at 4,7 million, the coloured population at 5,3 million and the Indian/Asian population at 1,5 million. Fifty-one per cent (30,8 million) of the population is female.

Table 5: Mid-year population estimates by population group and sex, 2021

Population group	Male		Female		Total	
	Number	% of total male population	Number	% of total female population	Number	% of total population
Black African	23 761 051	80,9	24 879 278	80,9	**48 640 329**	**80,9**
Coloured	2 578 930	8,8	2 716 038	8,8	**5 294 968**	**8,8**
Indian/Asian	790 412	2,7	754 810	2,5	**1 545 222**	**2,6**
White	2 257 654	7,7	2 404 805	7,8	**4 662 459**	**7,8**
Total	**29 388 047**	**100,0**	**30 754 931**	**100,0**	**60 142 978**	**100,0**

**Due to rounding totals may not add up to 100%*

The impact of the COVID-19 deaths is evident in the change in the population structure over the years 2020–2021 specifically in the elderly 60+ years aged. Figure 8 shows the rate of growth in various age categories. With the exception of the youth 15–24, all population age categories reflected a decline in the rate of growth between 2020 and 2021, compared to the previous period. Population growth rates between 2002 and 2021 reflect changes in fertility, mortality and migration that occurred over decades. Due to achievements in health and wellbeing, population growth rates prior to the COVID pandemic for youth 15–24 and adults 60+ were on the incline. The estimated annual population growth rate increased from approximately 1,0% for the period 2002–2003 to 1,4% for the period 2019–2020. However, in the period, 2020–2021 the overall growth rate declined to 1,0%, which is directly related to the drastic increase in deaths and decline in migration. The proportion of the elderly in South Africa was on the increase with the growth rate among elderly (60 years older) rising from 1,1% for the period 2002–2003 to 2,9% for the period 2019–2020. However, given the high mortality levels among the elderly during the COVID-19 pandemic, the growth rate among the elderly aged 60 and over drastically declined from 2,9% for the period 2019–2020 to 1,5% for the period 2020–2021. The social and economic effect of losing so many elderly people to the COVID-19 pandemic is likely to be felt in many years to come. Though not as drastic, the age group 25–59 also saw a decline in the rate of growth for the period 2020–2021. All three aspects of demography, i.e. declining fertility, declining international migration as well as a significant rise in deaths, significantly influenced the decline in the rate of growth for South Africa as a whole. The shifts in the demographic age and sex profile of South Africa due to the COVID-19 pandemic must be taken into consideration when planning for the future health, economics and welfare.

Given the fluctuation in fertility over time, the increase in the growth rate among children aged 0–14 between 2002 and 2013 is indicative of the rise in fertility between 2004 and 2008, ageing of children into the next age category, as well as the decline in infant and child mortality post-2006 (Appendix 4). The declining rate of growth post 2018 among children aged 0–14, reflects the overall decline in fertility since 2008.

Figure 8: Population growth rates by selected age groups over time, 2002–2021

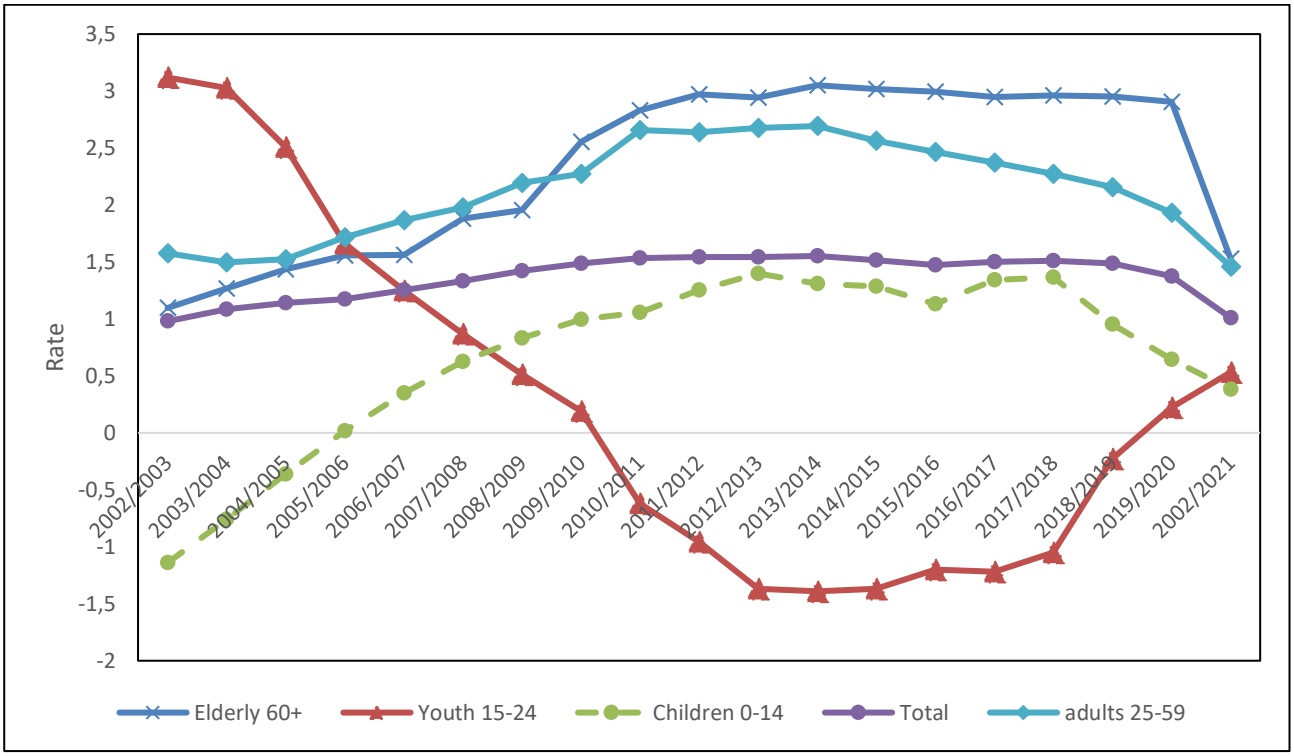


Table 6 shows the 2021 mid-year population estimates by age, sex and population group. About 28,3% of the population is aged 0–14 years and approximately 9,2% is 60 years and older. The impact of COVID-19 pandemic on the age structure is reflected in the growth rates by selected ages. As recommended by the World Health Organisation (WHO), a targeted approach to ameliorating the devastation of high mortality during the COVID-19 pandemic is essential. Using population estimates by age, the National Department of Health (2021) in South Africa have prioritised the elderly aged 60 and over, indicating a target of approximately 5 million elderly as part of their phase 2 vaccination programme. As of 30 June 2021, over 3 million (3 026 636) people had been vaccinated in the country and these included health care workers, persons aged 60+, and educators. Disaggregated estimates by geography will further assist in logistical arrangements for the rollout of vaccine across the country.

Table 6: Mid-year population estimates by population group, age and sex, 2021

	Black African			Coloured			Indian/Asian			White			RSA		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	2 489 851	2 426 636	**4 916 487**	240 201	232 899	**473 100**	50 114	48 428	**98 542**	112 081	108 746	**220 827**	2 892 247	2 816 709	**5 708 956**
5-9	2 455 059	2 393 961	**4 849 020**	239 556	232 813	**472 369**	50 511	48 492	**99 003**	123 196	119 708	**242 904**	2 868 322	2 794 974	**5 663 296**
10-14	2 446 375	2 399 489	**4 845 864**	234 661	228 774	**463 435**	49 443	47 037	**96 480**	134 338	130 906	**265 244**	2 864 817	2 806 206	**5 671 023**
15-19	2 090 466	2 067 941	**4 158 407**	210 590	206 406	**416 996**	45 706	43 245	**88 951**	124 046	121 541	**245 587**	2 470 808	2 439 133	**4 909 941**
20-24	1 992 901	1 977 929	**3 970 830**	211 387	207 490	**418 877**	51 800	46 130	**97 930**	126 000	125 668	**251 668**	2 382 088	2 357 217	**4 739 305**
25-29	2 270 406	2 231 322	**4 501 728**	217 970	214 774	**432 744**	69 998	57 000	**126 998**	131 006	131 658	**262 664**	2 689 380	2 634 754	**5 324 134**
30-34	2 410 309	2 355 690	**4 765 999**	218 368	215 636	**434 004**	80 045	63 662	**143 707**	143 992	142 941	**286 933**	2 852 714	2 777 929	**5 630 643**
35-39	2 074 547	2 062 260	**4 136 807**	194 061	197 275	**391 336**	80 532	65 414	**145 946**	154 920	156 242	**311 162**	2 504 060	2 481 191	**4 985 251**
40-44	1 534 854	1 591 929	**3 126 783**	161 127	165 697	**326 824**	68 789	57 568	**126 357**	148 631	153 136	**301 767**	1 913 401	1 968 330	**3 881 731**
45-49	1 206 489	1 279 518	**2 486 007**	152 061	158 745	**310 806**	59 636	53 374	**113 010**	167 564	176 751	**344 315**	1 585 750	1 668 388	**3 254 138**
50-54	860 667	1 021 063	**1 881 730**	140 900	162 528	**303 428**	49 709	48 568	**98 277**	166 824	175 131	**341 955**	1 218 100	1 407 290	**2 625 390**
55-59	671 692	902 968	**1 574 660**	123 289	146 485	**269 774**	41 406	44 847	**86 253**	150 595	162 541	**313 136**	986 982	1 256 841	**2 243 823**
60-64	490 932	730 225	**1 221 157**	96 305	119 049	**215 354**	32 942	38 387	**71 329**	145 827	162 143	**307 970**	766 006	1 049 804	**1 815 810**
65-69	352 508	576 247	**928 755**	64 767	90 841	**155 608**	25 424	32 392	**57 816**	131 749	148 676	**280 425**	574 448	848 156	**1 422 604**
70-74	219 767	407 811	**627 578**	39 563	62 808	**102 371**	17 323	25 478	**42 801**	115 957	135 638	**251 595**	392 610	631 735	**1 024 345**
75-79	116 404	251 516	**367 920**	20 478	37 955	**58 433**	9 933	17 324	**27 257**	86 965	106 690	**193 655**	233 780	413 485	**647 265**
80+	77 824	202 773	**280 597**	13 646	35 863	**49 509**	7 101	17 464	**24 565**	93 963	146 689	**240 652**	192 534	402 789	**595 323**
Total	**23 761 051**	**24 879 278**	**48 640 329**	**2 578 930**	**2 716 038**	**5 294 968**	**790 412**	**754 810**	**1 545 222**	**2 257 654**	**2 404 805**	**4 662 459**	**29 388 047**	**30 754 931**	**60 142 978**

8. Provincial population estimates

Provincial estimates are derived using a cohort-component method as suggested by the United Nations (United Nations, 1992), incorporating changes in births, deaths as well as migration over time. The provincial population estimates are developed using a 5-year cohort component method. The indicators of fertility, mortality and migration are derived for an average 5-year period i.e. 2016–2021. The input data for these indices are for the period July to June.

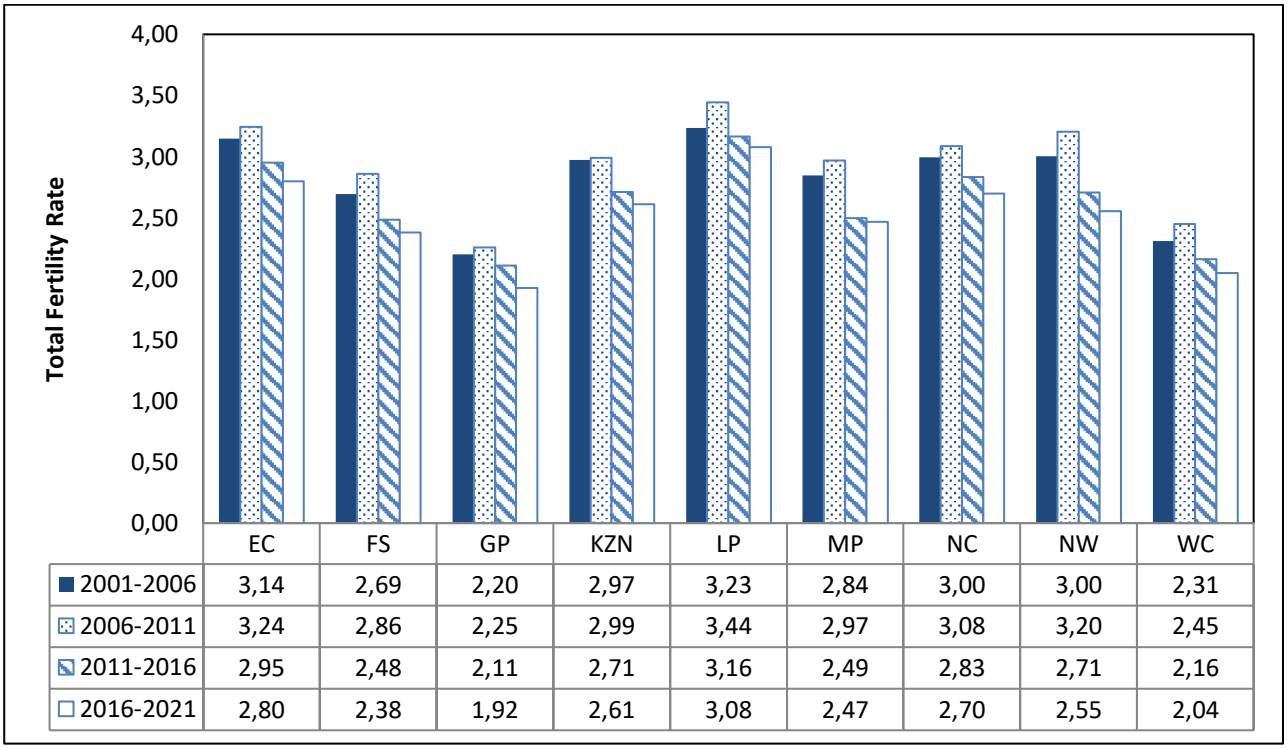
When provincial population estimates are desired and the appropriate data are available, a multi-regional approach should be considered as this is the only way to guarantee that the total migration flows between regions will sum to zero (United Nations, 1992). Multi-regional methods require the estimation of separate age-specific migration rates between every region of the country and every other region and such detailed data are rarely available. Although it is possible to estimate some of the missing data (see Willekens et al., 1978) the task of preparing data can become overwhelming if there are many regions. If there are only a few streams however the multi-regional method is the best method to use. In South Africa 2 448 (9x8x17x2) migration streams are derived if the multi-regional model is applied in calculating migration streams by age group (17 in total) and sex for each of the nine provinces.

The demographic data from the 2011 Census i.e. fertility, mortality and migration rates are incorporated in the assumptions. The population structure as per Census 2011 as well as the distribution of births and deaths from vital registrations (adjusted for late registration and completeness) are used to determine provincial estimates (Stats SA, 2017). Excess deaths due to COVID-19 for the period 2020–2021 have been incorporated into the model at the provincial level.

8.1 Demographic assumptions

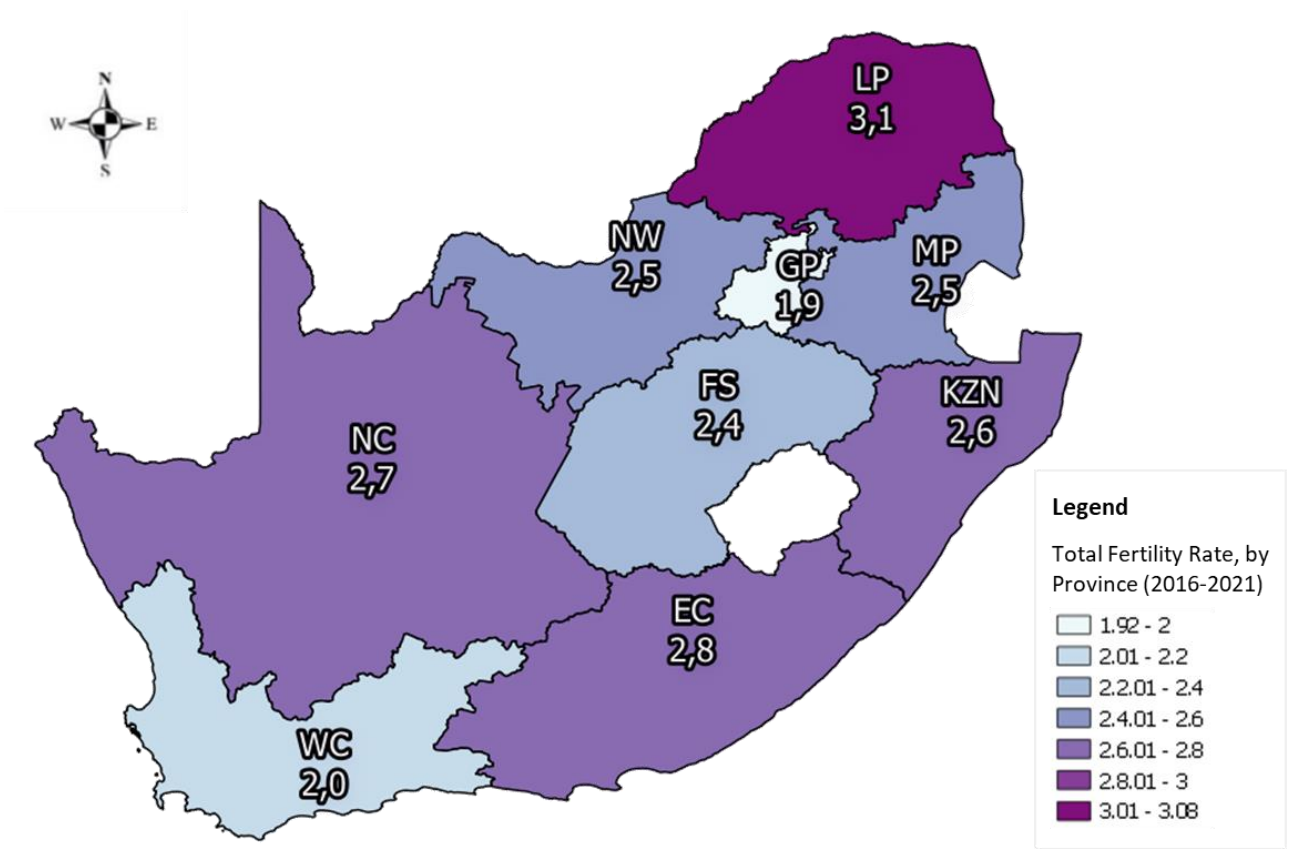
Figure 9 shows the provincial fertility estimates for the periods 2001–2006; 2006–2011; 2011–2016 and 2016–2021. In the period 2006–2011, there is a general rise in TFR, giving shape to the Census 2011 provincial population structure. However, for the period 2011–2021 there is an overall decline in TFR over time. Fertility varies from province to province as is depicted in Figure 9. The more rural provinces of Limpopo and Eastern Cape indicate higher fertility rates whilst more urbanised provinces such as Gauteng and the Western Cape indicate lower levels of fertility. Provincial estimates, will be revised when empirical data reflecting the effect of COVID-19 pandemic on births is published in the vital registration system. Current assumptions of provincial fertility are based on trends seen in published births data currently available at provincial level.

Figure 9: Provincial average total fertility rate over time, 2001–2021



	EC	FS	GP	KZN	LP	MP	NC	NW	WC
2001-2006	3,14	2,69	2,20	2,97	3,23	2,84	3,00	3,00	2,31
2006-2011	3,24	2,86	2,25	2,99	3,44	2,97	3,08	3,20	2,45
2011-2016	2,95	2,48	2,11	2,71	3,16	2,49	2,83	2,71	2,16
2016-2021	2,80	2,38	1,92	2,61	3,08	2,47	2,70	2,55	2,04

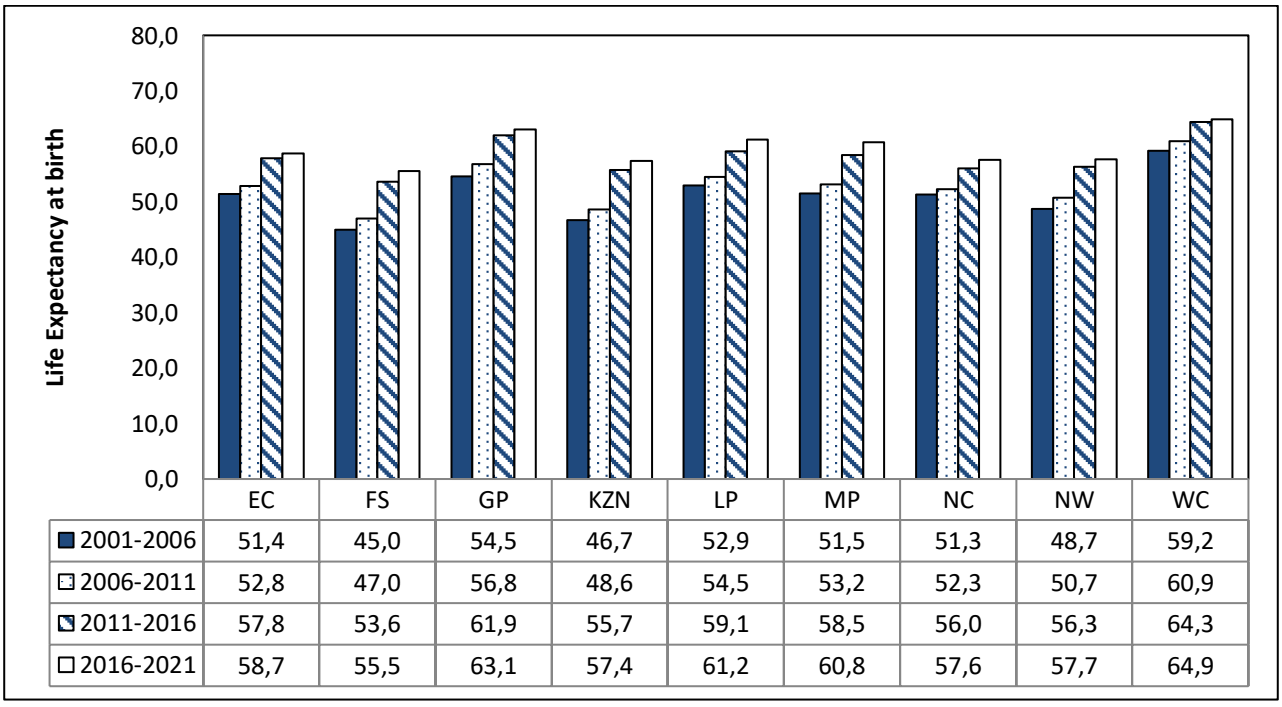
Figure 10: Provincial average total fertility rate, 2016–2021



Life expectancy at birth reflects the overall mortality level of a population. Figures 11 and 12 show the average provincial life expectancies at birth for males and females for the 5-year periods 2001–2006; 2006–2011; 2011–2016 and 2016–2021. Over the 16-month period (March 2020 to end June 2021), there has been great variability in the COVID-19 related morality rates occurring across the nine provinces and over time. Whilst the number of deaths in the Western Cape peaked earlier on during the pandemic (months of May and June 2020) other provinces soon followed suit. Behavioural factors affecting the spread, population age and sex structure of the province as well as varying health capacity across provinces, amongst others, played a determining role in mortality rates across provinces in the last 16 months (NICD, 2021). The impact of COVID-19 deaths occurring since March 2020 have been incorporated into the provincial estimation and slowed down the improvement in LE over the 5-year period.

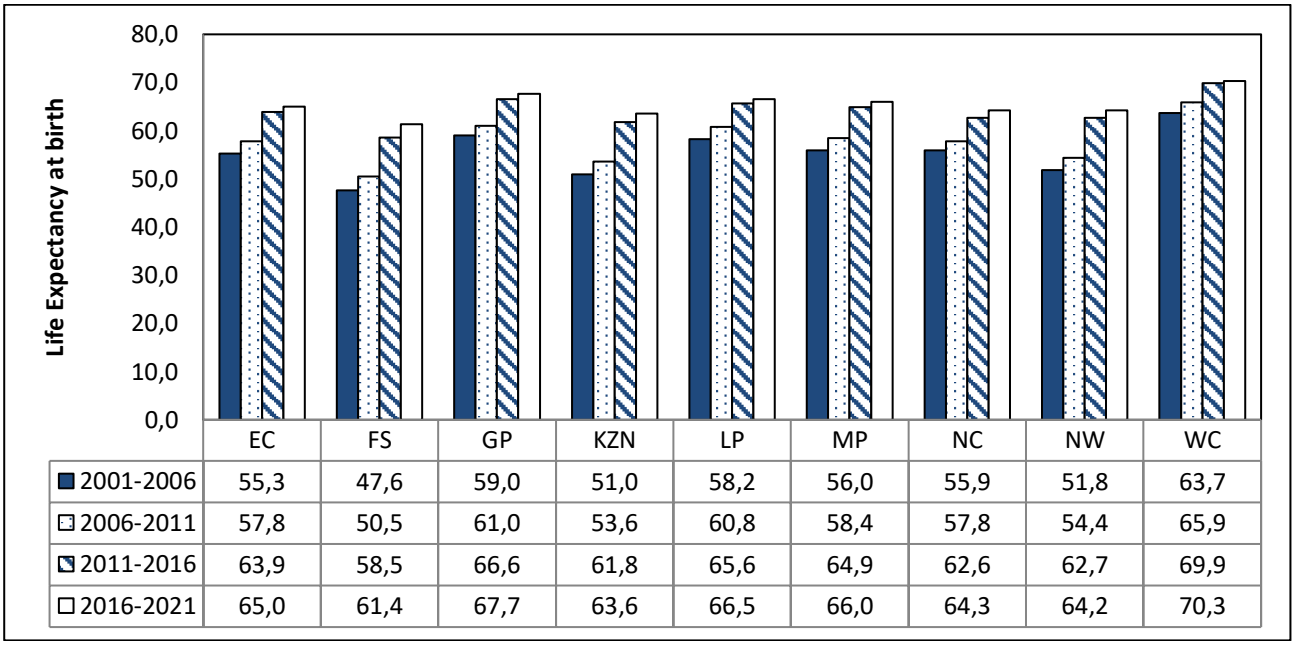
According to Figures 11 and 12, the life expectancy increased incrementally for each period across all provinces but more significantly in the period 2011–2016 due to the uptake of antiretroviral therapy over time in South Africa. Though the life expectancy in the periods 2001–2006 and 2006–2011, depicts marginal improvement, this masks the interaction between the highest number of deaths in 2006 in combination with declining numbers of deaths between 2007 and 2010. In the period 2016–2021 there is an average 6-year gap between male and female life expectancy in SA. Western Cape consistently has the highest life expectancy at birth for both males and females over time whilst the Free State has the lowest life expectancy at birth. The overall marginal improvement in LE expectancy across all provinces for the period 2016–2021 is indicative of the dramatic increase in deaths occurring between the 1st July 2020 and 30th June 2021.

Figure 11: Provincial average life expectancy at birth (males), 2001–2021



	EC	FS	GP	KZN	LP	MP	NC	NW	WC
2001-2006	51,4	45,0	54,5	46,7	52,9	51,5	51,3	48,7	59,2
2006-2011	52,8	47,0	56,8	48,6	54,5	53,2	52,3	50,7	60,9
2011-2016	57,8	53,6	61,9	55,7	59,1	58,5	56,0	56,3	64,3
2016-2021	58,7	55,5	63,1	57,4	61,2	60,8	57,6	57,7	64,9

Figure 12: Provincial average life expectancy at birth (females), 2001–2021



	EC	FS	GP	KZN	LP	MP	NC	NW	WC
2001-2006	55,3	47,6	59,0	51,0	58,2	56,0	55,9	51,8	63,7
2006-2011	57,8	50,5	61,0	53,6	60,8	58,4	57,8	54,4	65,9
2011-2016	63,9	58,5	66,6	61,8	65,6	64,9	62,6	62,7	69,9
2016-2021	65,0	61,4	67,7	63,6	66,5	66,0	64,3	64,2	70,3

8.2 Migration patterns

From Census 2011 it was possible to determine out-migration rates for each province. Applying these rates to the age structures of the province it was possible to establish migration streams between the provinces. The results of these analyses is shown in Tables 7, 8 and 9. The international migration to receiving provinces reflects that reduction post COVID-19 travel restrictions and movement is possible. Provincial estimates are developed based on a 5-year cohort component method; and as such interprovincial movement assumptions are required for a 5-year period (2016–2021). Inter-provincial migration assumptions by sex have not been revised due to the COVID-19 pandemic in the period March 2020–June 2021 (16 months). No empirical data capturing the change in interprovincial migration due to COVD-19 pandemic is yet available. Movement made during lockdown constitutes a temporary one in the majority of cases whilst inter-provincial migration in the mid-year estimation constitutes a more permanent move. In addition, the provincial estimates are for a 5-year period and the 16-month period of the COVID pandemic would contribute only a fourth of the 5-year period. The assumptions indicate that Gauteng and Western Cape received the highest number of in-migrants for all periods. The Eastern Cape, Limpopo and Gauteng experienced the largest number of outflow of migrants. Gauteng, Mpumalanga, Northern Cape, North West and Western Cape provinces received positive net migration over all three periods. For all periods, the number of international migrants entering the provinces was highest in Gauteng, with Western Cape ranking second. Census 2021 will be a key empirical resource indicating current trends in inter-provincial migration in South Africa.

Table 7: Estimated provincial migration streams 2006–2011

Province in 2006	Province in 2011									Out-migrants	In-migrants	Net migration
	EC	FS	GP	KZN	LP	MP	NC	NW	WC			
EC	0	12 905	144 629	97 342	13 859	16 652	7 997	37 374	173 255	504 013	162 038	-341 975
FS	8 198	0	79 727	7 640	6 364	10 469	8 802	23 084	11 828	156 112	114 887	-41 225
GP	40 023	31 059	0	53 838	63 743	63 369	9 687	85 177	75 029	421 925	1 396 585	974 660
KZN	23 464	11 352	206 292	0	8 809	33 764	7 912	10 734	30 656	332 983	256 313	-76 669
LP	4 174	5 427	322 935	7 662	0	44 311	2 411	30 224	10 591	427 734	221 176	-206 558
MP	4 585	4 755	122 234	11 521	21 398	0	2 106	12 219	8 925	187 742	243 639	55 896
NC	4 082	8 161	15 334	5 226	2 437	4 139	0	11 702	16 775	67 855	76 346	8 490
NW	4 561	10 395	95 401	5 378	17 576	10 496	20 766	0	8 004	172 579	275 690	103 112
WC	44 457	6 926	53 641	11 301	5 004	6 266	11 067	7 196	0	145 858	422 342	276 484
Outside SA (net migration)	**28 493**	**23 908**	**356 392**	**56 405**	**81 987**	**54 172**	**5 599**	**57 981**	**87 278**			

Table 8: Estimated provincial migration streams, 2011–2016

Province in 2011	Province in 2016									Out-migrants	In-migrants	Net migration
	EC	FS	GP	KZN	LP	MP	NC	NW	WC			
EC	0	12 983	145 520	97 930	13 942	16 748	8 060	37 484	174 233	506 901	181 268	-325 633
FS	8 374	0	81 383	7 804	6 504	10 698	8 996	23 587	12 107	159 452	128 193	-31 259
GP	45 986	35 679	0	61 952	91 377	72 858	11 133	97 947	86 469	503 400	1 528 924	1 025 524
KZN	24 769	11 982	217 619	0	9 334	35 675	8 365	11 358	32 439	351 540	280 660	-70 881
LP	4 367	5 665	337 324	8 019	0	46 273	2 524	31 528	11 053	446 755	271 154	-175 601
MP	4 972	5 146	132 574	12 470	23 111	0	2 286	13 226	9 657	203 441	270 874	67 432
NC	4 327	8 676	16 311	5 546	2 592	4 396	0	12 434	17 834	72 116	82 981	10 864
NW	4 971	11 291	103 662	5 849	19 067	11 394	22 591	0	8 730	187 555	306 140	118 585
WC	48 891	7 676	59 535	12 558	5 550	6 963	12 258	8 004	0	161 436	458 749	297 314
Outside SA (net migration)	**34 613**	**29 095**	**434 995**	**68 530**	**99 678**	**65 869**	**6 768**	**70 572**	**106 227**			

Table 9: Estimated provincial migration streams 2016–2021

Province in 2016	Province in 2021									Out-migrants	In-migrants	Net migration
	EC	FS	GP	KZN	LP	MP	NC	NW	WC			
EC	0	13 130	147 216	98 999	14 097	16 907	8 142	37 832	176 181	512 504	192 839	-319 665
FS	8 606	0	83 753	8 023	6 688	11 004	9 259	24 258	12 453	164 042	134 907	-29 135
GP	52 253	40 607	0	70 587	103 823	83 037	12 677	111 615	98 673	573 271	1 564 861	991 590
KZN	26 274	12 718	231 202	0	9 873	37 878	8 879	12 074	34 468	373 366	288 998	-84 367
LP	4 598	5 959	354 909	8 447	0	48 647	2 659	33 135	11 605	469 960	281 289	-188 671
MP	5 394	5 577	143 825	13 504	25 051	0	2 482	14 343	10 465	220 641	283 137	62 496
NC	4 598	9 245	17 413	5 898	2 763	4 681	0	13 244	18 994	76 837	88 433	11 596
NW	5 407	12 274	112 809	6 359	20 723	12 386	24 594	0	9 501	204 053	320 679	116 626
WC	53 745	8 473	65 819	13 882	6 132	7 700	13 528	8 858	0	178 136	470 657	292 521
Outside SA (net migration)	**31 965**	**26 925**	**407 915**	**63 299**	**92 140**	**60 896**	**6 214**	**65 320**	**98 317**			

8.3 Provincial distributions

Table 10 below shows the estimated percentage of the total population residing in each of the provinces from 2002 to 2021. The provincial estimates show that Gauteng has the largest share of the population, followed by KwaZulu-Natal, Western Cape and Eastern Cape. Inter-provincial as well as international migration patterns significantly influence the provincial population numbers and structures in South Africa. By 2021 approximately 11,8% of South Africa's population live in Western Cape. Northern Cape has the smallest share of the population (2,2%). Free State has the second smallest share of the South African population, constituting 4,9% of the population. Figure 13 indicates that Limpopo and Eastern Cape (34,0% and 32,7% respectively) have the highest proportions of persons younger than 15 years. The highest proportions of elderly persons aged 60 years and above are found in Eastern Cape (11,5%), Western Cape (10.4%) and Northern Cape (10,1%), as shown in Figure 14.

Table 10: Percentage distribution of the projected provincial share of the total population, 2002–2021

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
EC	14,3	14,1	13,9	13,8	13,6	13,4	13,2	13,1	12,9	12,7	12,5	12,4	12,2	12,0	11,9	11,7	11,6	11,4	11,2	11,1
FS	5,9	5,9	5,8	5,7	5,7	5,6	5,5	5,5	5,4	5,4	5,3	5,3	5,2	5,1	5,1	5,0	5,0	5,0	4,9	4,9
GP	20,9	21,2	21,5	21,8	22,1	22,4	22,7	23,0	23,3	23,6	23,8	24,1	24,4	24,7	25,0	25,3	25,6	25,8	26,1	26,3
KZN	20,8	20,7	20,6	20,5	20,4	20,3	20,2	20,1	20,0	19,8	19,8	19,7	19,6	19,5	19,5	19,4	19,3	19,3	19,2	19,1
LP	11,0	10,9	10,9	10,8	10,7	10,7	10,6	10,6	10,5	10,4	10,4	10,3	10,2	10,2	10,1	10,1	10,0	10,0	9,9	9,9
MP	7,7	7,7	7,7	7,7	7,8	7,8	7,8	7,8	7,8	7,8	7,9	7,9	7,9	7,9	7,8	7,8	7,9	7,9	7,9	7,9
NC	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2
NW	6,6	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,8	6,8	6,8	6,8	6,8	6,8	6,8	6,8	6,8	6,8	6,9
WC	10,5	10,6	10,7	10,8	10,9	10,9	11,0	11,1	11,2	11,3	11,3	11,4	11,5	11,5	11,6	11,6	11,7	11,7	11,8	11,8
Total	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**

Table 11 (a): Provincial mid-year population estimates by age and sex, 2021

	Eastern Cape			Free State			Gauteng			KwaZulu-Natal		
Age	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
0-4	345 058	336 296	**681 354**	135 743	132 789	**268 531**	668 597	653 243	**1 321 840**	616 235	598 179	**1 214 414**
5-9	370 816	360 513	**731 328**	138 334	134 924	**273 258**	633 876	618 934	**1 252 810**	607 730	590 612	**1 198 342**
10-14	388 607	379 429	**768 035**	147 659	145 346	**293 005**	577 229	569 943	**1 147 171**	602 489	589 468	**1 191 956**
15-19	317 549	307 009	**624 558**	128 202	126 589	**254 791**	534 347	542 072	**1 076 418**	522 062	512 711	**1 034 772**
20-24	226 028	226 351	**452 379**	114 560	115 314	**229 874**	677 086	672 225	**1 349 311**	481 991	478 653	**960 644**
25-29	236 880	232 066	**468 946**	119 605	118 622	**238 227**	827 240	841 564	**1 668 804**	509 125	506 950	**1 016 075**
30-34	257 392	259 840	**517 232**	130 366	128 909	**259 275**	874 911	854 935	**1 729 846**	510 284	517 162	**1 027 447**
35-39	225 499	239 270	**464 769**	115 654	117 824	**233 477**	751 503	731 975	**1 483 479**	430 757	460 949	**891 706**
40-44	172 119	193 003	**365 121**	88 097	96 239	**184 337**	587 239	562 300	**1 149 539**	309 310	356 928	**666 238**
45-49	142 437	176 514	**318 951**	74 851	84 736	**159 586**	497 101	439 914	**937 015**	253 024	304 015	**557 039**
50-54	110 821	159 033	**269 854**	60 653	73 876	**134 528**	376 409	360 211	**736 621**	183 073	249 090	**432 163**
55-59	93 131	153 034	**246 166**	50 353	65 363	**115 716**	300 458	310 803	**611 262**	149 270	229 645	**378 916**
60-64	78 726	141 961	**220 687**	40 186	54 201	**94 387**	232 333	256 849	**489 182**	115 294	191 508	**306 801**
65-69	63 153	117 043	**180 196**	31 005	45 771	**76 776**	169 242	200 360	**369 602**	89 215	155 435	**244 651**
70-74	46 226	89 456	**135 681**	20 504	34 124	**54 628**	112 027	141 758	**253 785**	63 704	122 893	**186 597**
75-79	32 466	65 311	**97 777**	12 364	21 944	**34 308**	61 502	86 198	**147 700**	37 105	76 917	**114 022**
80+	44 908	88 648	**133 555**	8 897	18 840	**27 737**	31 673	54 331	**86 004**	29 767	62 025	**91 791**
Total	**3 151 813**	**3 524 777**	**6 676 590**	**1 417 030**	**1 515 411**	**2 932 441**	**7 912 773**	**7 897 614**	**15 810 388**	**5 510 435**	**6 003 140**	**11 513 575**

Table 11 (b): Provincial mid-year population estimates by age and sex, 2021 (concluded)

	Limpopo			Mpumalanga			Northern Cape			North West			Western Cape		
Age	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
0-4	336 810	326 319	**663 129**	234 803	229 784	**464 586**	65 283	63 155	**128 438**	195 094	191 964	**387 058**	294 624	284 981	**579 605**
5-9	342 691	332 318	**675 009**	225 628	222 798	**448 426**	64 843	62 579	**127 422**	195 316	191 843	**387 159**	289 090	280 453	**569 542**
10-14	347 026	332 377	**679 403**	239 112	237 552	**476 663**	62 662	62 603	**125 265**	204 555	201 495	**406 050**	295 480	287 993	**583 473**
15-19	289 362	273 023	**562 385**	200 303	199 530	**399 833**	53 048	53 963	**107 012**	168 689	166 555	**335 244**	257 247	257 681	**514 928**
20-24	214 235	204 500	**418 735**	191 535	190 747	**382 282**	46 896	48 765	**95 661**	154 790	148 297	**303 087**	274 967	272 364	**547 331**
25-29	225 111	213 433	**438 544**	217 413	201 750	**419 163**	52 949	50 938	**103 886**	181 657	159 176	**340 833**	319 401	310 255	**629 656**
30-34	233 309	239 387	**472 696**	234 396	214 592	**448 988**	60 767	55 252	**116 019**	204 762	176 438	**381 200**	346 528	331 413	**677 941**
35-39	208 936	218 108	**427 044**	209 268	193 412	**402 680**	56 467	49 564	**106 031**	186 444	161 115	**347 559**	319 531	308 974	**628 505**
40-44	159 225	185 559	**344 784**	153 423	153 740	**307 163**	43 741	39 475	**83 215**	148 447	131 097	**279 544**	251 801	249 989	**501 790**
45-49	123 759	165 541	**289 300**	118 486	132 098	**250 584**	35 720	34 630	**70 350**	120 598	113 314	**233 912**	219 774	217 627	**437 402**
50-54	93 334	134 410	**227 744**	88 081	108 509	**196 589**	28 281	30 615	**58 895**	95 838	93 508	**189 347**	181 610	198 038	**379 649**
55-59	73 152	123 569	**196 720**	71 132	93 350	**164 482**	22 277	26 919	**49 196**	80 143	80 092	**160 234**	147 066	174 066	**321 132**
60-64	54 993	101 811	**156 804**	52 757	71 310	**124 067**	17 751	23 055	**40 806**	62 890	65 292	**128 182**	111 076	143 818	**254 894**
65-69	42 612	88 614	**131 226**	40 102	58 758	**98 860**	13 789	19 776	**33 564**	43 049	52 670	**95 718**	82 280	109 729	**192 009**
70-74	29 832	66 860	**96 692**	26 347	41 661	**68 008**	9 304	15 126	**24 430**	27 044	38 009	**65 053**	57 622	81 848	**139 470**
75-79	17 535	44 666	**62 200**	15 223	26 924	**42 147**	5 948	10 886	**16 834**	16 085	27 703	**43 788**	35 552	52 936	**88 488**
80+	19 729	64 578	**84 307**	14 884	34 177	**49 061**	4 739	11 282	**16 021**	10 275	28 612	**38 887**	27 662	40 298	**67 960**
Total	**2 811 651**	**3 115 073**	**5 926 724**	**2 332 894**	**2 410 691**	**4 743 584**	**644 464**	**658 582**	**1 303 047**	**2 095 676**	**2 027 178**	**4 122 854**	**3 511 311**	**3 602 465**	**7 113 776**

Figure 13: Population under 15 years of age

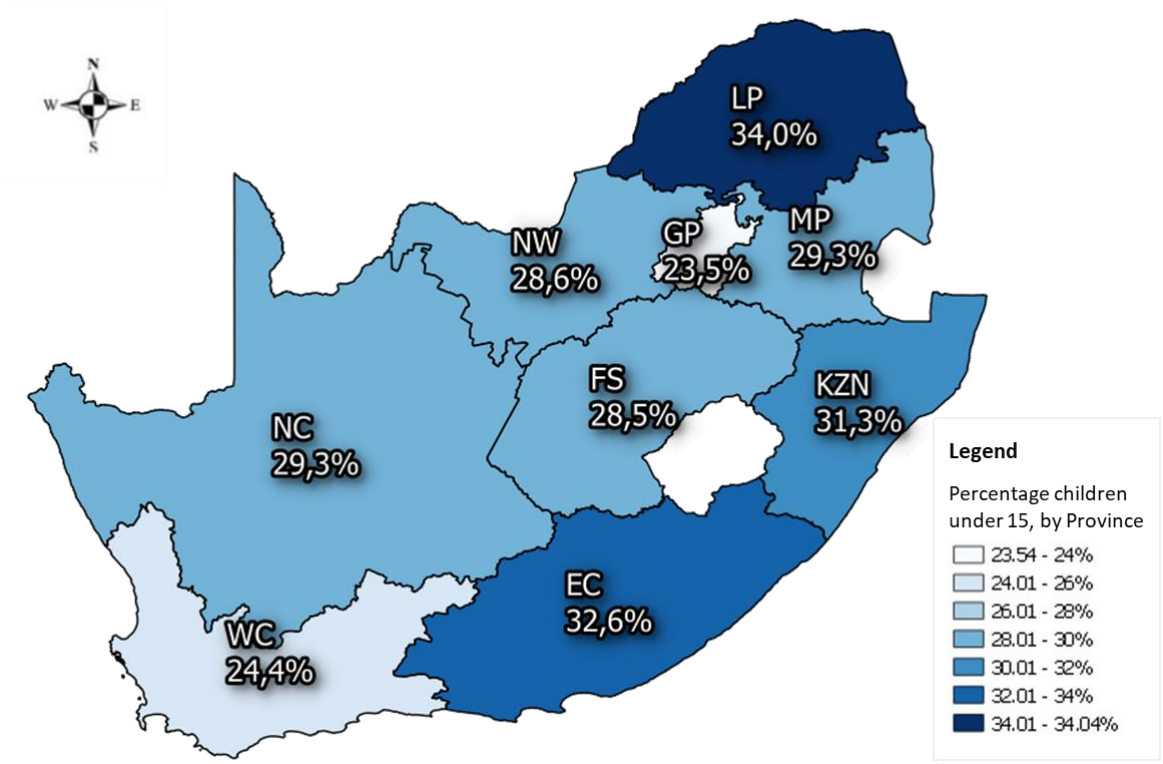
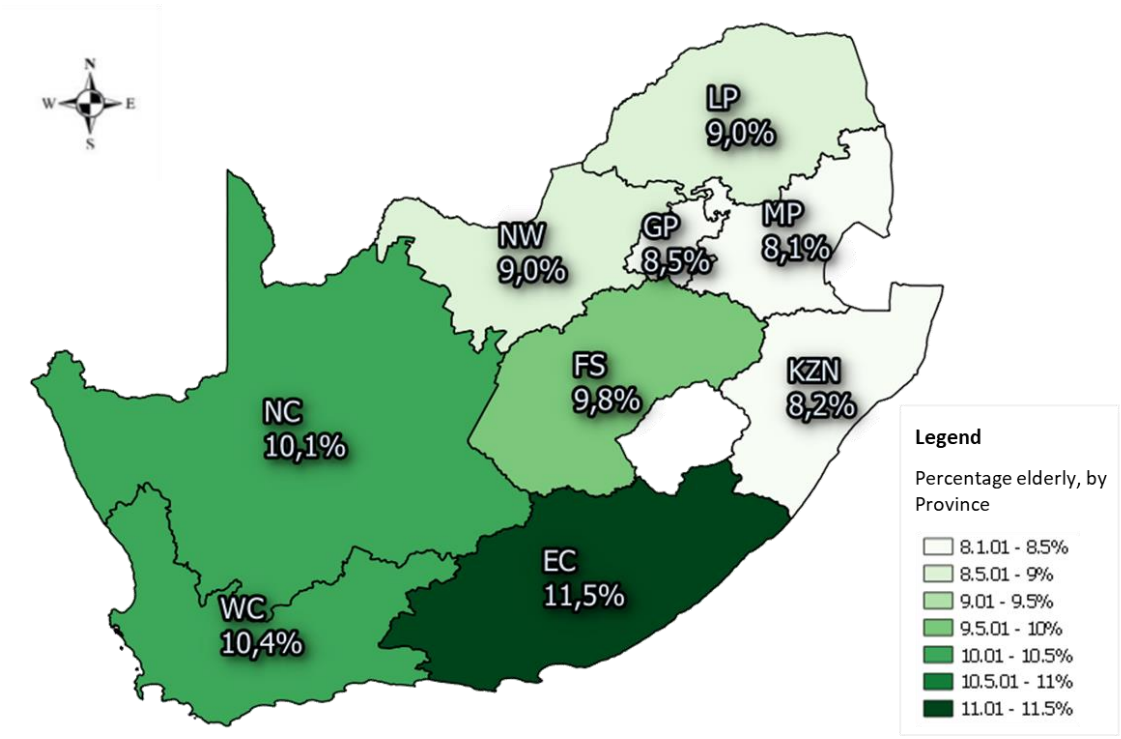


Figure 14: Proportion of elderly aged 60+



References

Aassve, A., Cavalli, L., Mencarini, S., Plach, M.,and Bacci, M, L (2020) *The COVID-19 pandemic and human fertility*, Science24 July 2020: 370371

Adsera, A.. 2011. "Where are the Babies? Labour Market Conditions and Fertility in Europe," *European Journal of Population* 27, 1-32.

Avenir Health (2021) Spectrum Version 6.08, www.avenirhealth.org.

Australia Bureau of Statistics (2021) *Overseas Arrivals and Departures*, Australia, 14 April 2021. https://www.abs.gov.au/statistics/industry/tourism-and-transport/overseas-arrivals-and-departures-australia/feb-2021

Aburto, J.M, Kashyap, R, Schöley, J,, et al (2021) *Estimating the burden of the COVID-19 pandemic on mortality, life expectancy and lifespan inequality in England and Wales: a population-level analysis*. Journal of Epidemiology Community Health Published Online First: 19 January 2021. doi: 10.1136/jech-2020-215505

Biswas, M., Rahaman, S., Biswas, T. K, Haque, Z., Ibrahim, B. (2021) *Association of Sex, Age, and Comorbidities with Mortality in COVID-19 Patients: A Systematic Review and Meta-Analysis*. Intervirology 2021; 64:36-47

Booth, A., Reed, A.B., Ponzo, S., Yassaee, A., Aral, M., Plans, D., Labrique, A., Mohan, D. (2021) *Population risk factors for severe disease and mortality in COVID-19: A global systematic review and meta-analysis*. PLoS One. 2021 Mar 4;16(3)

Bradshaw, D., Laubscher R., Dorrington R.E., Groenewald, P. and Moultrie, T., (2021*). Report on Weekly deaths in South Africa: 27th June to 3rd July 2021 (Week26)*. Burden of Disease Research Institute. South African Medical Research Council. Cape Town:

Carinci, F. (2020). Covid-19: Preparedness, Decentralisation, and the Hunt for Patient Zero: Lessons from the Italian Outbreak. *British Medical Journal*, 368(bmj.m799).

Dorrington R.E., Bradshaw D., Laubscher R., & Nannan, N. (2018*). Rapid mortality surveillance report 2018*, Cape Town: South African Medical Research Council. ISBN: 978-1-928340-30-0.

Dorrington R.E., Bradshaw D., Laubscher R., Groenewald, P. and Moultrie, T. (2021*). Methodological Note: Predicted numbers of deaths by Epi-week for South Africa in 2021 and 2021,* Cape Town: South African Medical Research Council.

Elsayed H, Hassany M. (2020). Antiretroviral therapy under the wing of the COVID-19 epidemic: One look, and different solutions. South African Journal of HIV Medicine. 2020; 21(1)

Goldstein, Joshua & Örsal, Deniz & Kreyenfeld, Michaela & Jasilioniene, Aiva. (2013). Fertility Reactions to the "Great Recession" in Europe. *Demographic Research*. 29. 85-104.

Goldstein, J.R., and Lee, R.D. (2020) *Demographic perspectives on the mortality of COVID-19 and other epidemics* PNAS September 8, 2020 117 (36) 22035-22041; first published August 20, 2020; https://doi.org/10.1073/pnas.2006392117**,** Edited by Douglas S. Massey, Princeton University, Princeton, NJ, and approved July 31, 2020 (received for review April 7, 2020)

Gona, P.N., Gona, C.M., Ballout, S. *et al.* (2020). Burden and changes in HIV/AIDS morbidity and mortality in Southern Africa Development Community Countries, 1990–2017. *BMC Public Health* **20,** 867 (2020).

Haas, E.j., Angulo, F.J., McLaughlin, J.M., Anis, E., Singer, S.R., Khan, F. et al (2021*) Impact and effectiveness of BNT162b2 vaccine against SARS-CoV2 infections and COVID-19 cases, hospitalisations and deaths*

following a nationwide vaccination campaign in Israel: an observational study using national surveillance data. The Lancet. Vol 397 issue 10287.

Heuveline P, Tzen M (2021) *Beyond deaths per capita: comparative COVID-19 mortality indicators.* Bio Medical Journal Open 2021;**11:**e042934.

IOM. (2021). *Global Mobility Restriction Overview (Issue COVID-19 Mobility Impacts UpdateSeries)*.

Karim S.S.A., (2020). *The South African response to the Pandemic,* New England Journal of Medicine. 2020; 382:e95.

Karlinsky A, Kobak D. (2021). The world mortality dataset: tracking excess mortality across countries during the COVID-19 pandemic. Preprint. Posted online January 29, 2021. MedRxiv. doi: 10.1101/2021.01.27.21250604

Kashte, S., Gulbake, A., El-Amin III, S.F. *et al.* (2021). COVID-19 vaccines: rapid development, implications, challenges and future prospects. *Human Cell* **34,** 711–733 (2021).

Kang, Seung Ji, and Sook In Jung (2020) *Age-Related Morbidity and Mortality among Patients with COVID-19*. *Infection & chemotherapy* vol. 52,2 (2020): 154-164. doi:10.3947/ic.2020.52.2.154

Kearney, M. S.; Levine, P. (2020) *Half a million fewer children? The coming COVID baby bust*. Brookings, 15 jun. 2020. Disponível em: https://www.brookings.edu/research/half-a-million-fewer-childrenthe-coming-COVID-baby-bust/. Acesso em: 7 jul. 2020.

Levin, A.T., Hanage, W.P., Owusu-Boaitey, N,, Cochran, K.B., Walsh, S.P., Meyerowitz-Katz, G. (2020) *Assessing the age specificity of infection fatality rates for COVID-19: systematic review, meta-analysis, and public policy implications.* European Journal of Epidemiology. 2020 Dec; 35(12):1123-1138.

Lewis, H. (2020) *The coronavirus is a disaster for feminism. Pandemics affect men and women differently.* The Atlantic, 19 Mar. 2020.

Lippi, G., Henry, B.M., Bovo, C., Sanchis-Gomar, F. (2020) *Health risks and potential remedies during prolonged lockdowns for coronavirus disease 2019 (COVID-19)*. Diagnosis (Berlin, Germany), v. 7, n. 2, p. 85-90.

Luppi, F.; Arpino, B.; Rosina, A. (2020) *The impact of COVID-19 on fertility plans in Italy, Germany, France, Spain and UK.* SocArXiv, May 2020.

Luy M, Di Giulio P, Di Lego V, Lazarevič P, Sauerberg M. (2019) *Life Expectancy: Frequently Used, but Hardly Understood*. Gerontology. 2020;66(1):95-104.

Matysiak, A., Sobotka, T., and Vignoli, D.(2021) *The Great Recession and Fertility in Europe: A Sub-national analysis*. European Journal of Population Vol 39: 29-64. Springer

Mchunu, G., Peltzer, K., Tutshana, B., & Seutlwadi, L. (2012). Adolescent pregnancy and associated factors in South African youth. *African health sciences*, *12*(4), 426–434.

Mirzaei, H., McFarland, W., Karamouzian, M. *et al.* COVID-19 Among People Living with HIV: A Systematic Review. *AIDS Behaviour* **25,** 85–92 (2021).

Moultrie, T., Dorrington R.E., Laubscher R., Groenewald, P. and Bradshaw D. (2021*). Correlation of excess natural deaths with other measures if the COVID-19 pandemic in South Africa,* Cape Town: South African Medical Research Council.

Nandi, A., Mazumdar, S., and Behrman, J, R,(2016) *The Effect of Natural Disaster on Fertility, Birth Spacing, and Child Sex Ratio: Evidence from a Major Earthquake in India* (January 21, 2016).

National Department of Health, (2018). *The 2015 National Antenatal Sentinel HIV and Herpes Simplex Type-2 Prevalence Survey,* South Africa, National Department of Health.

National Department of Health, (2017). *National Department of Health 2016/2017 Annual report, South Africa*, ISBN: 978-0-621-45639-4.

National Department of Health, (2018). *National Department of Health 2017/2018 Annual report, South Africa*, ISBN: 978-0-621-46663-8

National Department of Health, (2019). *National Department of Health 2018/2019 Annual report, South Africa*, ISBN: 978-0-621-47838-9

National Department of Health (2020) COVID-19 Coronavirus vaccine strategy. https://www.gov.za/COVID-19/vaccine/strategy# 17 Feb 2021.

National Institute for Communicable Disease (NICD) (2021 (a)) *COVID-19 Hospital Surveillance Update*, Week 14. www.nicd.ac.za

National Institute for Communicable Disease (NICD) (2021(b)) Quarterly *COVID-19 in children Surveillance report: Epidemiology and Clinical characteristics of Laboratory- confirmed COVID-19 among individuals' age ≤19 years, South Africa, 1 March 2020- 1 May 2021. 24th May 2021*. www.nicd.ac.za

OECD. (2020). *International Migration Outlook 2020*. OECD Publishing. https://doi.org/10.1787/ec98f531-en.

ONS (2020) *Migration statistics quarterly report: August 2020*. Statistical Bulletin. Office for National Statistics United Kingdom

Orsal, D.D.K. and Goldstein, J.R. (2010). *The increasing importance of economic conditions on fertility*. Paper presented at the Annual Meeting of the Population Association of America, Dallas, Texas, April 15-17, 2010.

Pasquariello,P., & Stranges, S. (2020). *Excess mortality from COVID-19: a commentary on the Italian experience* International Journal of Public Health, Springer; Swiss School of Public Health (SSPH+), vol. 65(5), pages 529-531, June

Phillips, H 2012. *Plague, pox and pandemics. A Jacana Pocket History of Epidemics in South Africa*. Auckland Park: Jacana.

Pillay-Van Wyk, V. et al. (2020) *COVID deaths in South Africa: 99 days since South Africa's first death*. South African Medical Journal, [S.l.], v. 110, n. 11, p. 1093-1099, Oct. 2020. ISSN 2078-5135.

Sobotka, T., Jasilioniene, A., Galarza, A. A., Zeman, K., Nemeth, L., & Jdanov, D. (2021) *Baby bust in the wake of the COVID-19 pandemic? First results from the new STFF data series*. SocArXiv, 24 Mar. 2021.

Sasson, I. (2021) *Age and COVID-19 mortality: A comparison of Gomperz doubling time across countries and cause of death*. Demographic Research Vol 44, Article 16 pages 379-396.

Sanyaolu, A., Okorie, C., Marinkovic, A., Patidar, R., Younis, K., Desai, P., Hosein, Z., Padda, I., Mangat, J., & Altaf, M. (2020). Comorbidity and its Impact on Patients with COVID-19. *SN comprehensive clinical medicine*, 1–8. Advance online publication.

South African COVID-19 Modelling Consortium (2020). *Estimating cases for COVID-19 in South Africa Update: 19 May 2020*, Presentation made by Silal, S., Pulliam, J., Meyer-Rath, G., Nichols, B., Jamieson, L., Kimmie,

Z., & Moultrie, H. on behalf of Modelling and Simulation Hub, Africa (MASHA), University of Cape Town, South Africa, South African DSI-NRF Centre of Excellence in Epidemiological Modelling and Analysis (SACEMA), University of Stellenbosch, South Africa, Health Economics and Epidemiology Research Office (HE2RO), University of the Witwatersrand, Johannesburg, South Africa, Boston University School of Public Health, US, National Institute for Communicable Diseases (NICD), South Africa.

Shisana O., Rehle T., Simbayi I., C, Zuma K., Jooste S., Jungi N., Labadarios D., Onoya D., et al. (2014). *South African National HIV Prevalence Incidence and Behaviour Survey 2012,* Cape Town, HSRC Press,

Simbayi LC, Zuma K, Zungu N, Moyo S, Marinda E, Jooste S, Mabaso M, Ramlagan S, North A, van Zyl J, Mohlabane N, Dietrich C, Naidoo I and the SABSSM V Team (2019). *South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2017.* Cape Town: HSRC Press

Simelela N. P., & Venter, W.D. F. (2014). *A brief history of South Africa's response to AIDS.* South African Medical Journal, March 2014, Vol 104, No. 3, Supplement 1, 249-251.

Ssentongo, P., Heilbrunn, E.S., Ssentongo, A.E., Advani, S. Chinchilli, V.M., Nunez, J.J. and Du, P.. (2021). Epidemiology and outcomes of COVID-19 in HIV-infected individuals: a systematic review and meta-analysis. *Science Rep* **11,** 6283 (2021).

Statistics South Africa (2015),"Census 2011: Fertility in South Africa", Statistics South Africa, Pretoria

Statistics South Africa (2020a), "Recorded live births: October 2020", Statistical Release P0305, Statistics South Africa, Pretoria.

Statistics South Africa (2020b), "Mortality and causes of death in South Africa, 2017: Findings from death notification", Statistical Release PO309.3, Statistics South Africa, Pretoria.

Statistics South Africa (2021a), "Quarterly Labour Force Survey: Quarter 4 2020", Statistical Release P0211, Statistics South Africa, Pretoria.

Statistics South Africa (2021b), "Tourism and migration March 2021", Statistical Release P0351, Statistics South Africa, Pretoria.

Statistics South Africa (2021c), "Tourism and migration April 2021", Statistical Release P0351, Statistics South Africa, Pretoria.

Statistics South Africa (2021d), "Tourism and migration June 2020", Statistical Release P0351, Statistics South Africa, Pretoria.

Stokes EK, Zambrano LD, Anderson KN, et al. *Coronavirus Disease 2019 Case Surveillance — United States, January 22–May 30, 2020*. MMWR Morbidity and Mortal Weekly Rep 2020; 69: 759–765.

STONE, L. Will the coronavirus spike births? IFS, 11 Mar. 2020. Disponível em: https://ifstudies. org/blog/will-the-coronavirus-spike-births. Acessed: 30 jun. 2020.

Reid A. (2005). The effects of the 1918-1919 influenza pandemic on infant and child health in Derbyshire. *Medical history*, *49*(1), 29–54.

United Nations (1992). *Preparing Migration Data for Sub-national Population Projections.* Department of International, Economic and Social Affairs, United Nations, New York.

USAID Health Policy Initiative (2009) *AIM: A Computer Program for Making HIV/AIDS Projections and Examining the Demographic and Social Impacts of AIDS*, New York.

USAID (2009) DemProj *Version 4. A computer program for making population projections (The Spectrum system of policy models).* New York.

Vignoli, D., Tocchioni, V., and Mattei, A. (2019). The impact of job uncertainty on first-birth postponement. *Advances in Life Course Research* 45(100308).

Willekens F., & Rogers A., (1978). *Spatial Population Analysis: Methods and Computer Programs.* International Institute for Applied System Analysis, Research Report, RR 78-18. Luxenberg, Austria.

Willekens F., Por A., & Raquillet, R. (1978). *Entropy multi-proportional and quadratic techniques for inferring detailed migration patterns from aggregate data.* International Institute for Applied System Analysis, Working Paper WP-79-88. Luxenberg, Austria.

Woldesenbet, S.A., Kufa, T., Lombard, C., Manda, S., Ayalew, K., Cheyip, M., and Puren, A. (2018). *The 2017 National Antenatal Sentinel HIV Survey,* South Africa, National Department of Health.

William Pick (2012) Book Review: Plague, Pox and Pandemics: A Jacana Pocket History of Epidemics in South Africa by Howard Phillips. *South African Medical Journal 2012*;102(10):783.

Appendices

Appendix 1: Mid-year population estimates by province, 2021

	Population estimate	% of total population
Eastern Cape	6 676 590	11,1
Free State	2 932 441	4,9
Gauteng	15 810 388	26,3
KwaZulu-Natal	11 513 575	19,1
Limpopo	5 926 724	9,9
Mpumalanga	4 743 584	7,9
Northern Cape	1 303 047	2,2
North West	4 122 854	6,9
Western Cape	7 113 776	11,8
Total	**60 142 978**	**100,0**

**Due to rounding totals may not add up to 100%*

Appendix 2: Demographic indicators, 2002–2021

Year	Crude birth rate	Life expectancy			Infant mortality rate	Under-5 mortality rate	Crude death rate	Rate of natural increase (%)
		Male	Female	Total				
2002	21,2	53,5	57,9	**55,8**	55,3	74,9	12,9	0,8
2003	21,1	53,0	57,7	**55,4**	57,0	76,5	13,2	0,8
2004	22,3	52,7	56,8	**54,8**	55,6	76,2	13,6	0,9
2005	23,0	52,4	56,1	**54,3**	55,5	74,9	14,1	0,9
2006	23,5	52,3	55,7	**54,0**	53,8	72,2	14,4	0,9
2007	23,9	52,7	56,2	**54,5**	49,5	68,0	14,2	1,0
2008	24,1	53,3	56,9	**55,2**	47,4	64,0	13,8	1,0
2009	23,8	54,4	59,5	**57,0**	44,1	57,2	12,7	1,1
2010	23,5	55,7	61,0	**58,4**	38,0	53,4	11,8	1,2
2011	22,9	57,4	62,8	**60,2**	36,2	48,3	10,8	1,2
2012	22,4	58,4	63,8	**61,1**	34,2	43,9	10,3	1,2
2013	22,0	59,0	64,6	**61,9**	31,9	41,1	10,0	1,2
2014	21,6	59,8	65,7	**62,8**	30,5	40,1	9,6	1,2
2015	21,1	60,2	65,8	**63,1**	29,2	39,6	9,5	1,2
2016	20,4	60,9	66,5	**63,8**	28,1	39,1	9,2	1,1
2017	20,5	61,6	66,8	**64,2**	26,9	38,3	9,0	1,1
2018	20,4	61,8	67,4	**64,7**	26,0	38,0	8,9	1,2
2019	20,1	62,1	67,8	**65,0**	24,8	36,7	8,8	1,1
2020	19,7	62,4	68,4	**65,5**	23,7	34,4	8,7	1,1
2021	19,4	59,3	64,6	**62,0**	24,1	30,8	11,6	0,8

Appendix 3: HIV prevalence estimates and number of people living with HIV, 2002–2021

	Prevalence %				Incidence rate %	HIV population (in millions)
	Women 15–49	Adults 15–49	Youth 15–24	Total population	15–49	
2002	15,24	13,18	6,31	8,14	1,9	3,78
2003	15,98	13,77	6,32	8,62	1,9	4,04
2004	16,55	14,21	6,29	9,01	1,8	4,27
2005	17,00	14,55	6,25	9,33	1,7	4,47
2006	17,40	14,83	6,18	9,59	1,7	4,65
2007	17,77	15,09	6,13	9,83	1,7	4,83
2008	18,16	15,38	6,11	10,07	1,6	5,01
2009	18,78	15,80	6,16	10,39	1,7	5,24
2010	19,40	16,22	6,20	10,70	1,6	5,48
2011	20,07	16,69	6,23	11,05	1,6	5,75
2012	20,76	17,19	6,29	11,41	1,6	6,03
2013	21,38	17,63	6,29	11,73	1,5	6,30
2014	21,96	18,06	6,24	12,06	1,5	6,57
2015	22,49	18,45	6,21	12,37	1,5	6,84
2016	22,84	18,71	6,05	12,61	1,3	7,08
2017	23,17	18,96	5,92	12,84	1,3	7,32
2018	23,44	19,16	5,79	13,06	1,2	7,55
2019	23,64	19,31	5,68	13,26	1,2	7,79
2020	23,80	19,42	5,60	13,47	1,2	8,02
2021	23,92	19,50	5,53	13,68	1,2	8,23

Appendix 4: Estimates of annual growth rates, 2002–2021

Period	Children 0–14	Youth 15–24	Elderly 60+	Adults 25–59	Total
2002–2003	-1,14	3,12	1,10	1,58	**0,98**
2003–2004	-0,76	3,03	1,27	1,50	**1,08**
2004–2005	-0,36	2,51	1,44	1,53	**1,14**
2005–2006	0,02	1,66	1,56	1,71	**1,17**
2006–2007	0,35	1,25	1,56	1,86	**1,25**
2007–2008	0,63	0,87	1,88	1,98	**1,33**
2008–2009	0,83	0,52	1,95	2,19	**1,42**
2009–2010	1,00	0,19	2,56	2,27	**1,49**
2010–2011	1,06	-0,62	2,83	2,66	**1,53**
2011–2012	1,25	-0,96	2,97	2,64	**1,54**
2012–2013	1,40	-1,37	2,94	2,68	**1,54**
2013–2014	1,31	-1,39	3,05	2,69	**1,55**
2014–2015	1,29	-1,37	3,02	2,57	**1,51**
2015–2016	1,13	-1,20	2,99	2,46	**1,47**
2016–2017	1,34	-1,22	2,95	2,37	**1,50**
2017–2018	1,37	-1,05	2,96	2,27	**1,51**
2018-2019	0,95	-0,23	2,95	2,16	**1,49**
2019-2020	0,64	0,22	2,90	1,93	**1,37**
2020-2021	0,38	0,53	1,53	1,46	**1,01**

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