Estimating the completeness of birth registration in South Africa,

2002 - 2016

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Statistics South Africa

Risenga Maluleke

Report no. 03-06-04

Estimating the completeness of birth registration in South Africa, 2002–2016 / Statistics South Africa

Published by Statistics South Africa, Private Bag X44, Pretoria 0001

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Stats SA Library Cataloguing-in-Publication (CIP) Data
Estimating the completeness of birth registration in South Africa, 2002–2016 / Statistics South Africa. Pretoria: Statistics South Africa, 2024

Report no. 03-06-04
30 pp

ISBN: **978-0-621-51830-6**

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Preface

Statistics South Africa (Stats SA) is mandated to provide the state and other stakeholders with official statistics on the demographic, economic and social situation of the country to support planning, monitoring and evaluation, including the implementation of programmes and other initiatives. Stats SA has conducted four Censuses (1996, 2001, 2011 and 2022) and various household-based surveys. These data sources have been widely used to produce demographic indicators for evidence-based decision-making in the country. However, the use of administrative data from Civil Registration and Vital Statistics (CRVS) systems remain minimal, especially in the context of estimating completeness of birth registration. As a step to encourage the use of birth and other related data from the South African CRVS system, the current report looked at the completeness of birth registration (reporting) in South Africa in the period 2002–2016. Completeness was estimated at national level and disaggregated by province.

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Abbreviations

CEIC	Circular Economy Indicators Coalition
CRVS	Civil Registration and Vital Statistics
CS	Community Survey
DHA	Department of Home Affairs
IUSSP	International Union for the Scientific Study of Population
RSM	Reverse Survival Method
SDG	Sustainable Development Goals
SSA	Sub-Saharan Africa
Stats SA	Statistics South Africa
UN	United Nation
UNECEF	United Nations Children's Fund/United Nations International Children's Emergency Fund
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
WHO	World Health Organisation
WPP	World Population Prospect

1. Executive Summary

This study examined the completeness of birth registration from 2002–2016 in South Africa, using indirect estimation models (RSM and Relational Gompertz) and WPP data, to estimate expected birth distributions. Results revealed that registered births were high, with an increasing trajectory within years and between the annual calendar period of registrations. This is so, particularly for births registered within the current year of birth. There were significant gaps between registered births within the first and second year over time.

Nationally, estimated births from both indirect methods were higher than the registered births across the study period. Evidence from registered and expected births indicated that the highest number of births were recorded in KwaZulu-Natal and Gauteng provinces overtime, whilst the least were reported in Northern Cape. Northern Cape showed the number of estimated births that were slightly lower than the registered births; except in 2016 where it recorded somewhat higher estimated births (23 369) than registered births (22 734).

Also, completeness levels increased within an annual calendar period from the first to the fifth year of registration at the national level. Results show that Northern Cape had the highest level of completeness from 2002–2016, with the exception of Free State in 2004 where it stood at 87,5% in the first year of registration. The second highest level of completeness was pronounced in Free State that recorded between 74,6% (2003) and 86,7% (2016) in the same period. These are so with the exception of 2002 which stood at 63,1%. Overtime, the lowest completeness of registration was reported in Eastern Cape compared to other provinces. However, KwaZulu-Natal showed the lowest completeness level in 2004, 2005 and 2015 respectively.

Results further show that in each lag (interval/ between calendar periods), completeness levels have been increasing over the study periods and throughout all provinces. Over the lags (lag 1–5 years), Northern Cape had the highest level of completeness across the study period. The highest level of completeness was noticeable in the 5th year of registration with over 100% registration from 2004 to 2012. On the other hand, Eastern Cape recorded the lowest level of completeness overtime and across all the lags. Completeness levels using RSM compared well with the Gompertz and WPP at the registration within one year at national level.

2. Background

Completeness of birth registration is the measure of the extent of which births occurring in a country are registered by the civil registration system each year (WHO, 2010; Nannan et al., 2019). Completeness is defined as the proportion of vital events (births or deaths) recorded by the Civil Registration and Vital Statistics (CRVS) system during a reference time out of the total events estimated to have occurred in the study population over the same period (Hill, 2017). Studies suggest that estimating completeness of birth registration is central in the achievement of Sustainable Development Goals (SDGs) (Ebbers and Smit, 2022; ISI, 2018; Lai and Tey, 2021; Rao et al., 2020; Stats SA, 2021/22; UN, 2015; UNECEF, 2016). Specifically, the SDG 16.9 which proclaims the provision of legal identity for all, including birth registration by 2030 (ibid).

A child's birth registration is regarded as a fundamental human right that ensures identity and safeguarding of children from harm and exploitation, including their importance in the development of population health policy and research (Ebbers and Smit, 2022; UNECEF, 2016; Nannan et al., 2019; Kruger, 2022; ISI, 2018; Lai and Tey, 2021; Rao et al., 2020). As "a crucial element of modern life" (Garenne et al., 2016:1), the registration of births is also vital for development planning and administration, including the evaluation of services by the government (Ebbers and Smit, 2022; Garenne et al., 2016). Therefore, having a high-quality Civil Registration and Vital Statistics (CRVS) in place in all countries is central and a major target of the United Nations (UN) (Lima et al., 2018; Lu et al., 2015; Stats SA, 2022).

Global studies on completeness of birth registration and under-registration reveal variations in methodology, associated factors, and levels of completeness (Aboagye et al., 2023; Brito et al., 2017; Hunter and Sugiyama, 2018; Kasasa et al., 2021; UNICEF Global Database, 2017; Makinde et al., 2016; UNICEF, 2016). According to these studies, although birth registrations has been slightly high and near completion in some countries, it remains incomplete in most developing countries. For example, in 2013, the United Nations Children's Fund (UNICEF) observed that only 65% of children younger than five years were registered globally (UNICEF, 2013). Ebbers and Smit (2022) wrote that only half of new-born children currently have their birth registered in sub-Saharan Africa (SSA), while Aboagye et., al. (2023) found that only 48,3% of births (average) were registered in the region, with the lowest and highest found in countries such as Ethiopia (2,7%) and Sierra Leone (92,9%) respectively.

Therefore, in recognising South Africa as a successful case in terms of birth registration, Wong et al. (2016) in reference to UNECEF (2013) observed that the rate increased from under 25% in 1991 to 95% in 2012, suggesting a remarkable improvement, universal and demonstration of extraordinary will and capacity (UNECEF, 2016). Nannan et al. (2019) in a study in South Africa observed an improvement of registration with a total of 76% registrations occurring within the calendar year of birth in 2008. While completeness levels of 84% occurred by the end of the following year, with an estimation of 90% occurring before the child's fifth birthday. The study by Garrene et al. (2016) in rural area of South Africa also found that the level of completeness was at 90,5% in 2014. In acknowledging these completeness levels, Kruger (2022) observed that although South Africa's birth registration rate is higher compared to other countries in the African region, it is still behind the UNICEF target of universal birth registrations.

Estimating the completeness of birth registrations in South Africa is difficult for several reasons. First, the denominator, that is, the precise number of total births and deaths that occur in the country is controversial, and various estimates made from censuses, demographic surveys, and models vary by a margin of 10% or more (Garenne et al., 2016). In light of the above narratives, empirical evidence also reveals paucity of studies around the area of estimation of completeness in the country, especially in using multiple indirect demographic estimation techniques in the derivation of birth distributions. These are so, to allow for wider comparability.

Therefore, in addressing these gaps, the study examined the completeness of birth registration at national and provincial levels in South Africa using actual birth distributions derived from two indirect demographic techniques and WPP data for the period 2002-2016. According to Stats SA (2019) “Providing demographic indicators at sub-national levels is important for tracking progress and providing interventions. This is because national estimates often mask the greater variations that exist at the lower levels of geography” (Stats SA, 2019:5). It is envisaged that doing these will not only help in addressing existing gaps, but will also result in broader knowledge, leading to informed programme and policy in the country.

3. Aim and Objectives

The study aimed at estimating completeness levels of birth registrations at national and provincial level for the period 2002–2016 in South Africa, using various indirect demographic estimation methods to derive actual births. Specifically, the study objectives were to unveil the trends and patterns of completeness levels of birth registrations (2002–2016) and briefly discussed their implication in the South African context.

4. Methodology

4.1 Study Methods

The Reverse Survival Method (RSM) and Relational Gompertz model were used to derive independent birth estimates, which were used to compare with the number of registered birth distributions obtained from the CRVS. Birth distribution estimates were also extracted from United Nations World Population Prospects, 2022. Distributions obtained were used to estimate completeness levels in the study period. According to the United Nations (2022), the estimation of completeness levels of birth registrations requires the comparison of observed number of birth events recorded by a CRVS (the numerator) with a counterfactual “true” number of birth events (the denominator) in the form of a ratio. The denominator is expected to represent the best estimate of expected births. The basic formula adopted is shown below:

$$Completeness\ (\%) = \frac{Number\ of\ events\ registered\ in\ covered\ areas}{Total\ number\ of\ events\ expected\ in\ covered\ areas} \times 100$$

Source: UN, 2022

The measure was introduced to improve the timeliness of birth registrations. Also, as “a key measure of the quality of vital statistics data and an assessment of effectiveness and efficiency of processes at the Department of Home Affairs (DHA)” (Stats SA, 2022:3). To arrive at the true number of birth events, this report used the RSM as the main method and the Relational Gompertz model and WPP estimates to affirm (compare) the outputs of births – including the completeness levels from RMS at the national level. Literature also refers to this approach as the indirect demographic methods of estimating births (Rao, 2020).

In line with Stats SA definition, late registration is understood in the study as birth registered after the calendar year of birth. Also, the study assumed the end of February of the following calendar year of birth, as the closing date for data captured for a given year (Nannan et al., 2016/19). Prior to the application of the methods, it is recommended that quality assessment of various data used in the study be carried out. These should be done by properly looking at the age and sex distribution of the population, including other indices (indicator) to determine quality, credibility and consistency. Stats SA has done these assessments in past research and findings suggest reasonable data fit for use (Stats SA, 2011/2015b; Stats SA, 2016).

4.1.1 Reverse Survival Method (RSM)

The RSM is an indirect estimation method appropriate to use in estimating birth distributions and fertility levels from the data collected in a census or survey. In using children 0–14 years and female population 15–64 from a census/survey and a set of child and adult probabilities of survivorship, the method simply projects backward fertility levels and births that occurred *n* years ago, amongst other outputs (Timæus and Moultrie, 2013; Spoorenberg, 2014). The model allows children 0–14 years to be matched with women aged 15–64 within a household (Ong'aro, 2014).

Advantages of the method are that it requires little data inputs for computation and that it produces annual estimates of Total fertility rate (TFR), General fertility rate (GFR) and births for the past 15 years prior to the Census enumeration. Although Timæus and Moultrie (2013) in reference to UN Population Division 1983 observed that the method has not been widely used in South Africa, recent evidence revealed that it has been used to assess the quality and completeness of birth registration in the country in recent time (Nannan et al, 2019, Moultrie, 2021).

Assumptions of the methods are that age and sex distribution of the population used is accurately reported and complete, and that the population is closed to migration (Timæus and Moultrie, 2013). “However, because children usually migrate with their mothers, errors in the numerator and denominator of the estimated rates largely cancel out” (Moultrie et al., 2013:83) and substantial bias might result only if migration flows are significant (ibid). Notwithstanding the migration assumption, results show consistency with earlier studies. Application of the method was achieved using the Excel templates obtained from the International Union for the Scientific Study of Population (IUSSP) website.

4.1.2 Relational Gompertz Model and WPP

The relational Gompertz model is also an indirect demographic estimation technique, used in the estimation of fertility indicators and related distributions. This model “estimate age-specific and total fertility by determining the shape of the fertility schedule from data on recent births reported in censuses or surveys, while determining its level from the reported average parities of younger women” (Moultrie, 2013:54). Its advantage is the ability to correct the errors of current and lifetime fertility (ibid). The model produces outputs of adjusted average parities, age-specific fertility rates and total fertility rate. The WPP distributions were sourced from the United Nations 2022 site.

5. Data source

The study used Census 2011, Community Survey (CS) 2016, and South Africa's CRVS – recorded live birth data, 2002–2016. The Census 2011 and CS 2016 data were collected using similar methodology. The WPP data was also employed in the study.

6. Study limitations

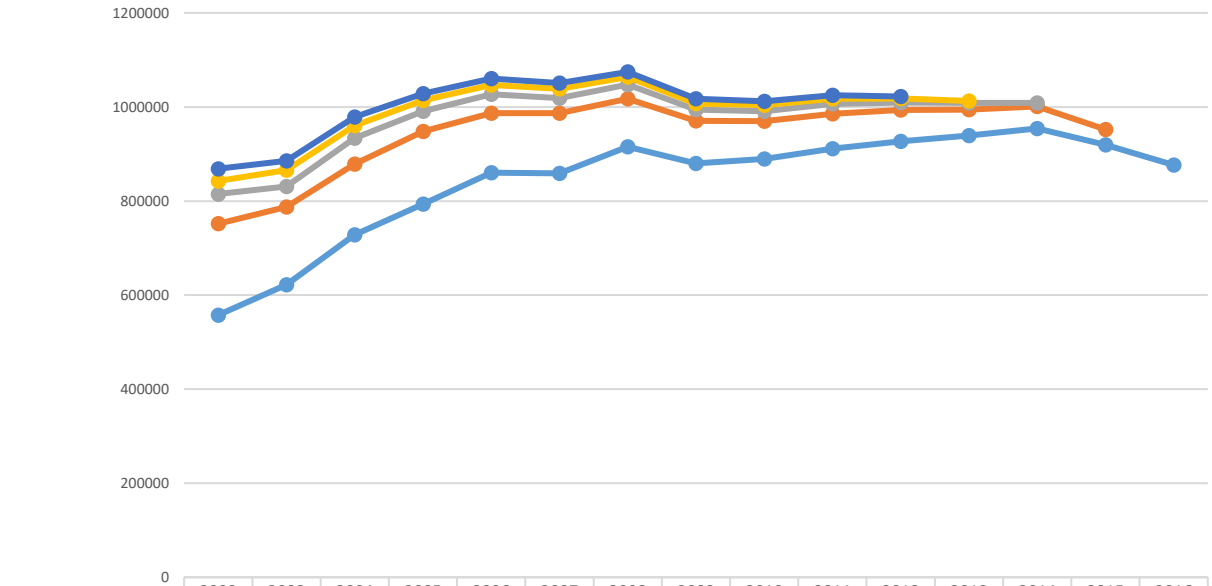
Due to the migration assumption of RSM, it is recommended that caution be exercised in this regard specifically, when data is disaggregated at local levels (Spooreberg, 2014; Moultrie, 2013). However, the consistency of results with that of other studies done in South Africa (e.g. Nannan et al., 2019; Moultrie 2021) is encouraging and suggest validity of the study. Also, early study has acknowledged methodological inconsistencies, such as terminological confusion and timeliness of registration among government and other international agencies such as the UNICEF (Nannan et al., 2019). This then becomes a concern.

7. Results

7.1 Trends and patterns of birth registration CRVS, 2002–2016

Figure 1 and Figure 3 (i-ix) in the appendix represent trends and patterns of birth registrations by calendar year of birth and time of registration, CRVS, 2002–2016. Results show that the number of births registered were high and on an increasing trajectory as the year increases. This is so, especially for registered births within the current year of birth. Across all the years and lags (interval/between calendar periods) of registration, there was a slight decrease of registration in 2009 and 2010. For instance, within the first year of birth registration, the number increased from 557 573 in 2002 to 915 674 in 2008 and showed a steady declining pattern between 2009 and 2010. A decline from 919 562 to 876 435 was observed between 2015 and 2016 in this period. Similar patterns were observed in the subsequent periods of registration. Furthermore, there has been a significant increase of registration from the first year of registration to the second year of registration. In 2002, the number increased from 557 573 in the first calendar period to 751 777 in the second calendar year. Provincial disaggregation shows patterns consistent with expectations with provinces such as Gauteng and KZN reporting highest number of birth registration and Northern Cape recording the least.

Figure 1: Trends and patterns of birth registration by calendar year of birth and time of registration CRVS, 2002–2016

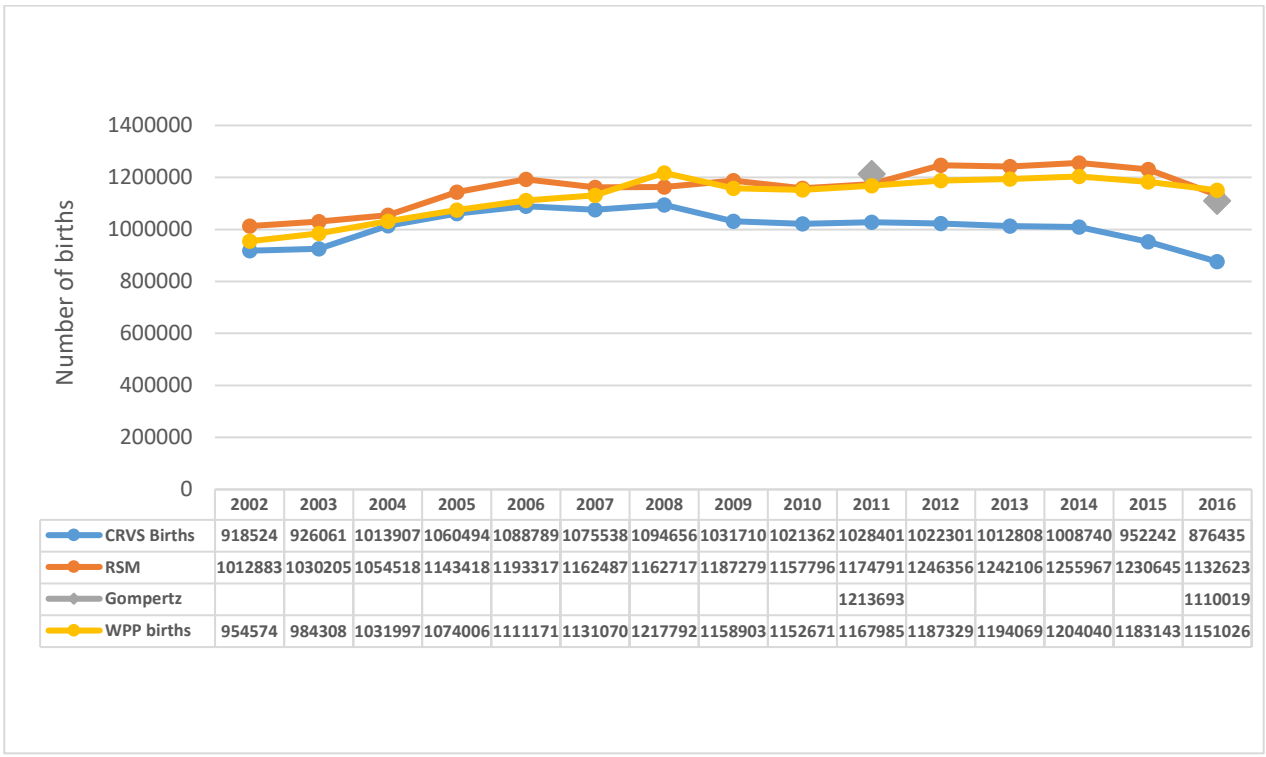


	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
within 1 year	557573	621887	728283	793788	860263	858866	915674	879707	889691	911353	926726	939011	954385	919562	876435
within 2 years	751777	787549	878829	948119	986621	987202	1017417	970771	969770	985727	993501	994213	1001139	952242	
within 3 years	815011	830953	933770	990688	1027175	1019087	1047581	994436	990775	1006750	1009648	1008338	1008740		
within 4 years	842712	865554	960539	1014420	1046685	1038410	1063672	1007501	1003753	1017648	1018530	1012808			
within 5 years	868754	885563	978408	1028628	1060421	1051038	1074448	1017439	1012171	1024845	1022301				

7.2 National estimated (expected) and registered births

Figure 2 shows the estimated (expected) and registered births in South Africa (RSM, Gompertz, WPP and CRVS registered live birth in numbers), 2002–2016**.** The patterns suggest that values of estimated births from RSM were higher than the CRVS registered births across the years. The Gompertz values were also higher than the RSM, WPP and CRVS registered births in 2011 and with a value of 1 110 019, slightly lower than the value of RMS (1 132 623) and WPP (1 151 026) in 2016.

Figure 2: Estimated (expected) and registered births in South Africa (RSM, Gompertz, WPP and CRVS registered live births in numbers), 2002–2016



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CRVS Births	918524	926061	1013907	1060494	1088789	1075538	1094656	1031710	1021362	1028401	1022301	1012808	1008740	952242	876435
RSM	1012883	1030205	1054518	1143418	1193317	1162487	1162717	1187279	1157796	1174791	1246356	1242106	1255967	1230645	1132623
Gompertz										1213693					1110019
WPP births	954574	984308	1031997	1074006	1111171	1131070	1217792	1158903	1152671	1167985	1187329	1194069	1204040	1183143	1151026

7.3 Estimated (expected) and registered births by province, 2002–2016

Table 1 and Figure 4 (i-ix) (appendix) indicate the trends and patterns of estimated and registered births (RSM, Gompertz and CRVS registered live births), provinces, 2002–2016. The patterns of expected and registered births at the provincial level were almost consistent at the national level. The registered births reported an increasing trend from 2002 to 2008 and a declining pattern between 2009 and 2010 across all the provinces. Also, a noticeable declining pattern was observed in 2015 and 2016 in all the provinces overtime. With the exception of 2016 which recorded somewhat higher estimated births (23 369) than registered births (22 734), the Northern Cape, relative to other provinces showed number of births from RSM slightly lower than the registered births. These patterns were also consistent in Free, Gauteng and KwaZulu-Natal, with RSM values slightly lower than registered births between one to three calendar periods. The highest number of births were recorded in KwaZulu-Natal and in Gauteng overtime, whilst the least were reported in Northern Cape.

Table 1: **Estimated and registered births (RSM, Gompertz and CRVS) by province, 2002-2016**

Provinces	Reg Births and model	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Western Cape	Reg Births	86 293	87 311	98 022	104 105	109 242	109 410	112 523	108 098	105 880	104 649	103 774	98 430	102 319	98 789	92 514
	RSM	100 288	103 419	107 703	111 352	116 238	112 822	111 206	114 781	114 475	112 392	116 390	113 523	124 147	114 684	113 053
	Gomperts										118 855					113 886
Eastern Cape	Reg Births	127 128	135 750	149 237	153 052	155 189	146 871	142 638	129 006	124 422	126 272	124 561	120 768	121 817	113 343	104 614
	RSM	146 688	152 823	167 328	180 969	188 847	186 898	180 904	180 286	170 335	168 910	182 829	177 690	171 951	162 642	146 368
	Gomperts										148 489					147 161
Northern Cape	Reg Births	21 454	22 042	23 845	24 068	24 523	24 842	25 434	24 622	24 580	24 632	25 385	25 107	25 259	24 778	22 734
	RSM	21 097	21 906	22 136	23 136	23 577	22 436	22 462	22 970	21 691	23 029	23 868	25 024	24 961	24 193	23 369
	Gomperts										25 921					26 832
Free state	Reg Births	49 452	51 645	55 246	57 663	57 812	58 105	59 294	55 121	55 400	54 182	54 047	51 493	52 460	48 564	45 053
	RSM	49 436	52 399	50 587	56 846	58 091	55 670	55 933	56 698	55 445	57 210	58 699	57 376	56 659	56 419	51 976
	Gomperts										59 937					60 125
KwaZulu-Natal	Reg Births	236 020	221 012	230 495	240 287	249 572	239 858	241 675	223 505	220 325	218 711	214 025	214 682	212 128	195 887	176 585
	RSM	244 024	241 571	244 391	269 787	277 452	266 485	267 247	274 656	266 386	276 166	282 338	285 550	288 497	282 224	247 035
	Gomperts										251 511					203 690
North West	Reg Births	52 306	54 443	60 266	63 620	63 270	65 357	66 773	65 684	63 839	65 040	65 933	61 035	61 125	58 345	55 118
	RSM	66 892	66 542	67 466	75 024	75 950	75 027	79 251	78 172	77 038	79 239	86 134	82 849	86 676	81 394	79 126
	Gomperts										80 927					79 476
Gauteng	Reg Births	177 697	179 265	201 048	209 233	217 165	217 107	226 266	217 981	219 699	219 211	218 966	225 178	219 996	209 020	195 370
	RSM	189 611	195 551	195 828	210 215	225 832	222 479	220 071	228 067	228 458	226 658	242 387	248 022	255 548	257 929	244 008
	Gomperts										269 511					253 140
Mpumalanga	Reg Births	69 981	73 769	81 759	85 440	85 249	86 009	88 417	84 205	82 327	85 189	85 622	80 492	82 323	74 800	67 815
	RSM	83 437	83 408	85 368	89 420	93 493	89 509	91 328	96 720	92 716	94 460	102 991	103 021	101 891	103 124	92 481
	Gomperts										102 266					93 936
Limpopo	Reg Births	93 745	96 391	109 399	118 396	122 157	122 814	127 414	121 121	124 062	129 554	129 030	128 404	128 796	125 349	116 616
	RSM	111 411	112 586	113 711	126 670	133 837	131 161	134 315	134 930	131 252	136 729	150 720	149 053	145 637	148 036	135 209
	Gomperts										146 385					147 262

7.4 Estimation of completeness levels within one to five years of registration, nationally 2002–2016

Table 2 represent the estimated completeness of births registered within one to five-years registration periods in South Africa, RSM, Gompertz and WPP, 2002-2016. Results using RSM show that the completeness level has been increasing within the first annual calendar period from 2002 (55%) to 2016 (77,4%). Also, completeness has been increasing with the lag years from within one year to within five years of registration. Results show that the highest levels of completeness were recorded mostly in 2008 with the completeness level of 78,8% within one year of registration to 92,4% within the fifth year of registration. The Gompertz method estimated completeness of 75,1% and 79% in 2011 and 2016 respectively. These compared well with the RSM and WPP completeness within one year of registration which stood at 77,6% and 77,4% (RSM) and 78% and 76,1% (WPP) in 2011 and 2016 respectively.

Table 2: Estimated completeness of births registered within one to five-years registration periods in South Africa, RSM, Gompertz and WPP, 2002–2016

Year	Registered Within one-year completeness (%)	Registered Within two-years completeness (%)	Registered Within three-years completeness (%)	Registered Within four-years completeness (%)	Registered within five-years completeness (%)	Gompertz estimated completeness within one-year (%)	Estimated Completeness using WPP births distribution (%)
2002	55,0	74,2	80,5	83,2	85,8		58,4
2003	60,4	76,4	80,7	84,0	86,0		63,2
2004	69,1	83,3	88,5	91,1	92,8		70,6
2005	69,4	82,9	86,6	88,7	90,0		73,9
2006	72,1	82,7	86,1	87,7	88,9		77,4
2007	73,9	84,9	87,7	89,3	90,4		75,9
2008	78,8	87,5	90,1	91,5	92,4		75,2
2009	74,1	81,8	83,8	84,9	85,7		75,9
2010	76,8	83,8	85,6	86,7	87,4		77,2
2011	77,6	83,9	85,7	86,6	87,2	75,1	78,0
2012	74,4	79,7	81,0	81,7	82,0		78,1
2013	75,6	80,0	81,2	81,5			78,6
2014	76,0	79,7	80,3				79,3
2015	74,7	77,4					77,7
2016	77,4					79,0	76,1

7.5 Estimated completeness of birth registration by province, 2002–2016

Table 3 shows the estimated completeness of birth registration within one year of birth by province, RSM and Gompertz, 2002–2016. Provincial estimates revealed trends consistent with the national patterns using the RSM, but not necessarily so, using the Gompertz method in some provinces. Except for the Free State in 2004 (87,5%), the results show that Northern Cape had the highest level of completeness from 2002–2016 and across all the provinces. The second highest level of completeness was reported in the Free State with a completeness level between 63,1%% (2002) and 86,7% (2016). Overtime, the lowest completeness of registration was reported in Eastern Cape. The pattern for 2016 revealed that lowest completeness was evident in North West (69,7%), Eastern Cape and KwaZulu-Natal (71,5%) using the RSM. The North West (69,4%) followed by the Eastern Cape (71,1%) reported the least in 2016 using the Gompertz method.

Table 3: Estimated completeness of births registration within one year of birth by province, RSM and Gompertz, 2002–2016

Province	Model/Method	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Western Cape	RSM	69,4	67,2	75,2	78,9	81,3	83,2	89,5	84.5	84,6	86,7	84,5	82,4	79,6	84,3	81,8
	Gompertz										82					81,2
Eastern Cape	RSM	40,9	48,4	57,6	60,3	62,6	61,6	65	59,8	62,4	65,3	60,2	62,3	66,5	67,1	71,5
	Gompertz										74,2					71,1
Northern Cape	RSM	72,1	77,3	86,5	85,4	89,3	95,4	101,4	96,6	104,3	99,6	100,3	96,5	98,7	100,5	97,3
	Gompertz										88,5					84,7
Free State	RSM	63,1	74,6	87,5	84,5	85,5	91,1	94,7	87,4	91,4	88,4	86,8	86	89,4	84,1	86,7
	Gompertz										84,4					74,9
KwaZulu-Natal	RSM	52,9	53,4	56,3	57,2	64,4	66,2	70,9	66,3	69,2	67,1	65,8	67,4	67,6	65,3	71,5
	Gompertz										73,6					86,7
North West	RSM	46,4	57	64,1	62,6	64,9	68,1	68,5	69,7	70,9	71,2	68,6	68	67,3	69,7	69,7
	Gompertz										69,8					69,4
Gauteng	RSM	66,2	69,6	82,2	81,6	80,3	81,7	89,1	83,2	85,7	87,7	83,4	85,2	82	78,8	80,1
	Gompertz										73,7					77,2
Mpumalanga	RSM	41,2	55,5	66,8	68,1	69,3	73,1	77,2	71,7	74	77,6	75	72	76,6	70,2	73,3
	Gompertz										71,7					72,2
Limpopo	RSM	53,4	63,2	76,4	73,7	75,2	76,4	81,7	78,3	83,1	84,6	78,6	80,5	84,2	82,4	86,2
	Gompertz										79,1					79,2
SA	**RSM**	**55**	**60,4**	**69,1**	**69,4**	**72,1**	**73,9**	**78,8**	**74,1**	**76,8**	**77,6**	**74,4**	**75,6**	**76**	**74,7**	**77,4**
	Gompertz										**75,1**					**79**

7.6 Estimation of completeness within one to five years of registration by province

Table 4 (i-v) indicates the estimated completeness levels of birth registered within one to five years of registration by province, RSM, 2002–2016. Results indicate that level of completeness has been increasing within the period and from one calendar period to the other (i.e the first year of registration to the fifth year of registration of birth). Throughout each lag, Northern Cape had the highest level of completeness across the study period and provinces. The highest level of completeness was noticeable in registration within five years, with more than 100% registration from 2004 to 2012 in the province. Across all the lags, Eastern Cape recorded the lowest level of completeness overtime. This is so, with the exception of some provinces in certain periods. For instance, within the third lag of registration, North West had the lowest levels of 70,7% and 75,0% in 2002 and 2003, while the Eastern Cape stood at 72,9% and 77,0% over the same period respectively.

Table 4 (i-v): Estimated completeness levels of birth registered within one to five years of registration by province, RSM, 2002–2016

	Table i: Completeness level within one year of registration								
Year	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpumalanga	Limpopo
2002	69,4	40,9	72,1	63,1	52,9	46,4	66,2	41,2	53,4
2003	67,2	48,4	77,3	74,6	53,4	57,0	69,6	55,5	63,2
2004	75,2	57,6	86,5	87,5	56,3	64,1	82,2	66,8	76,4
2005	78,9	60,3	85,4	84,5	57,2	62,6	81,6	68,1	73,7
2006	81,3	62,6	89,3	85,5	64,4	64,9	80,3	69,3	75,2
2007	83,2	61,6	95,4	91,1	66,2	68,1	81,7	73,1	76,4
2008	89,5	65,0	101,4	94,7	70,9	68,5	89,1	77,2	81,7
2009	84,5	59,8	96,6	87,4	66,3	69,7	83,2	71,7	78,3
2010	84,6	62,4	104,3	91,4	69,2	70,9	85,7	74,0	83,1
2011	86,7	65,3	99,6	88,4	67,1	71,2	87,7	77,6	84,6
2012	84,5	60,2	100,3	86,8	65,8	68,6	83,4	75,0	78,6
2013	82,4	62,3	96,5	86,0	67,4	68,0	85,2	72,0	80,5
2014	79,6	66,5	98,7	89,4	67,6	67,3	82,0	76,6	84,2
2015	84,3	67,1	100,5	84,1	65,3	69,7	78,8	70,2	82,4
2016	81,8	71,5	97,3	86,7	71,5	69,7	80,1	73,3	86,2

Year	Table ii: Completeness levels within two years of registration								
	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpumalanga	Limpopo
2002	77,4	64,1	88,2	84,6	74,9	65,5	80,5	65,8	74,0
2003	75,6	71,2	90,3	87,5	72,0	71,6	81,2	75,8	78,5
2004	83,6	75,2	98,4	98,4	74,2	79,3	92,4	83,4	88,8
2005	87,6	75,0	96,8	93,5	74,5	76,8	90,9	85,1	87,0
2006	88,5	74,2	97,7	92,4	77,5	75,8	88,3	82,3	85,2
2007	92,0	71,9	104,9	97,5	79,3	80,1	90,3	87,8	88,3
2008	96,4	73,0	108,2	100,0	81,5	78,1	95,9	89,5	90,1
2009	90,6	66,7	103,2	92,5	75,2	78,8	90,0	81,4	86,0
2010	89,6	68,5	109,9	96,1	77,4	78,3	91,5	83,9	90,9
2011	91,0	70,8	104,6	92,2	74,5	78,5	93,1	86,4	91,8
2012	87,7	65,6	104,7	90,3	72,7	74,6	88,0	80,8	83,8
2013	85,7	66,4	99,5	88,5	73,2	72,5	89,2	76,8	84,9
2014	82,2	70,2	100,9	92,0	72,5	70,2	85,5	80,4	87,9
2015	86,1	69,7	102,4	86,1	69,4	71,7	81,0	72,5	84,7
2016									

Year	Table iii: Completeness levels within three year of registration								
	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpumalanga	Limpopo
2002	80,1	72,9	93,3	90,5	82,6	70,7	85,1	73,8	79,1
2003	78,7	77,0	93,7	91,1	77,4	75,0	84,3	80,2	81,3
2004	86,8	81,3	102,3	102,1	82,6	83,5	95,8	88,5	92,1
2005	89,9	79,1	99,4	95,9	80,0	79,6	93,6	89,3	89,7
2006	90,9	77,6	99,8	94,5	82,6	78,6	91,0	86,0	87,9
2007	93,9	74,4	106,8	99,3	83,4	82,4	92,6	90,8	90,4
2008	98,4	75,1	110,2	101,9	85,3	80,4	98,3	92,4	92,3
2009	92,2	68,4	104,8	94,2	77,7	80,8	92,0	83,9	87,6
2010	90,9	70,2	111,3	97,6	79,5	80,3	93,3	86,1	92,6
2011	92,1	72,7	105,8	93,3	76,9	80,4	94,8	88,3	93,4
2012	88,6	67,0	105,6	91,2	74,5	75,8	89,2	82,2	84,9
2013	86,6	67,6	100,1	89,4	74,6	73,4	90,4	77,9	85,8
2014	82,4	70,8	101,2	92,6	73,5	70,5	86,1	80,8	88,4
2015									
2016									

Year	Table iv: Completeness levels within four years of registration								
	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpumalanga	Limpopo
2002	82,0	76,7	95,7	93,2	86,0	72,9	87,2	76,9	80,8
2003	81,2	81,9	96,1	93,4	82,8	77,4	86,3	83,0	82,8
2004	88,4	84,3	104,1	104,1	86,7	85,2	97,7	90,9	93,4
2005	91,3	81,1	100,8	97,2	83,2	81,2	95,3	91,5	91,1
2006	91,9	79,2	100,9	95,6	85,1	79,9	92,3	87,5	89,1
2007	95,0	75,7	108,1	100,6	85,9	83,9	94,1	92,7	91,7
2008	99,5	76,2	111,2	103,2	87,2	81,7	99,7	94,1	93,3
2009	93,0	69,3	105,6	95,3	79,1	82,0	93,1	85,1	88,4
2010	91,6	71,3	112,3	98,5	80,9	81,6	94,4	87,2	93,5
2011	92,7	73,7	106,4	93,9	78,1	81,4	95,7	89,2	94,1
2012	89,1	67,8	106,1	91,7	75,4	76,4	90,0	82,9	85,4
2013	86,7	68,0	100,3	89,7	75,2	73,7	90,8	78,1	86,1
2014									
2015									
2016									

Year	Table v: Completeness levels within five years of registration								
	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpumalanga	Limpopo
2002	83,7	80,6	97,6	95,2	90,0	74,6	88,8	79,1	81,9
2003	82,5	84,6	97,3	94,6	85,9	78,5	87,7	84,7	83,7
2004	89,4	86,1	105,1	105,3	89,4	86,4	99,1	92,5	94,4
2005	91,9	82,3	101,7	98,1	85,3	82,1	96,3	92,7	91,9
2006	92,6	80,0	101,8	96,6	86,9	80,9	93,4	88,8	89,9
2007	95,7	76,5	109,1	101,8	87,4	84,9	95,2	94,0	92,4
2008	100,1	77,0	111,8	104,1	88,4	82,7	100,7	95,1	93,9
2009	93,5	70,2	106,3	96,0	80,1	83,0	94,0	85,9	89,0
2010	92,1	72,1	112,8	99,1	81,8	82,3	95,1	88,1	94,0
2011	93,0	74,3	106,8	94,4	78,8	81,9	96,4	89,9	94,5
2012	89,2	68,1	106,4	92,1	75,8	76,5	90,3	83,1	85,6
2013									
2014									
2015									
2016									

8. Discussion

The study examined the completeness of birth registration in South Africa using birth distributions obtained from different indirect methods (RSM, Gompertz, and WPP). Results using the RSM revealed the number and proportion of births registered were high, with an increasing trajectory (trend) within years and between annual calendar periods of registration i.e. from one calendar period to the other. The findings revealed that the level of completeness increased within the first annual calendar period from 2002 (55%) to 2016 (77,4%). Also, completeness increased with the lag years from within one year (55%) to within five years of registration (85,8%) in the same year. It also increased significantly from 78,8% to 92,4% between the same calendar registration periods in 2008. Completeness proportions of 92,8% and 90% births were registered in 2004 and 2005, while a proportion of 92,4% completeness was achieved in 2008 in the fifth year of calendar registration (i.e. the fourth year after the calendar year of birth). Completeness levels obtained using the RSM were almost consistent with those obtained using Gomperts and WPP at the first year of registration at the national levels.

Overall, these completeness levels do not only suggest high and increasing patterns, but also implies a near universal birth registration completeness levels in South Africa. These findings are consistent as earlier studies have acknowledged that South African birth registration is not only high but also near universal over time (UNICEF, 2013; Wong et al., 2016). Also, the study revealed peaks recorded mostly in 2008 and attaining an all-time high of 92,4% in the fifth calendar period. In support of this observation, global and national studies such as CEIC (2021) and Garenne et al., (2016) observed that completeness levels reached an all-time high of 92% in 2008 in South Africa.

Other studies such as Nannan et al. (2016) and Beko (2021) have also found completeness levels to be high and increasing in South Africa. Specifically, in using the RSM to derive births distribution, Nannan et al. (2016) found completeness proportions to have improved from 76% to 84% between the first and second annual calendar year in 2008. And that about 92% of births were registered in 2004 and 2005 in the fourth year after the year of birth (Nannan, et al., 2016). Also, Garrene et al. (2016) recorded a high completeness level of 90,5% in 2014 in a study in a rural area community of South Africa (Garrene et al., 2016). Although, given the increasing patterns and near universalness observed from the study, literature (e.g. Musizvingoza et al., 2023; Makinde et al., 2016; etc.) has however reported inconsistencies and contrary patterns in some sub-Saharan African countries.

The study also revealed completeness levels patterns with a more pronounced gap between first and second calendar year periods. Thus, suggesting that more registration was carried out in the first calendar year of registration, with the overall number of registrations increasing as the year's increases. Early study in South Africa has also observed that overall completeness improved considerably over time (Nannan et al., 2016). However, given this context, Moultrie (2021) wrote that birth registration in South Africa is still subject to extensive delays and incompleteness as observed in other developing countries (Moultrie, 2021), as such, has room for further improvement.

Among others, the high and increasing completeness levels observed in the study may be attributed to factors such as government commitment, change in legislation, improved collection processes and administrative structures, improved programme and policies adapted in the country in recent time (Beko, 2021; Nannan et al., 2016; Garrene et al., 2016; Stats SA, 2020/21). For example, literary evidence has alluded to the improvement in the collection processes and administrative structures, resulting from the introduction of Births and Deaths Registration Act 51 of 1992 in the country (Beko, 2021; Nannan et al., 2016; Kruger, 2022). Specifically, section 9 of this Act requires that any child born alive in the country must be registered within the 30 days of the birth (Beko, 2021; Stats SA, 2021). According to these studies, the introduction of this policy (Act) has resulted to a markedly improvement in birth registration in the country since 1992, presenting South Africa as a successful case in the African region (Garenne et al., 2016; UNECEF, 2016; Wong et al., 2016).

The study revealed that apart from the Northern Cape, Free State and Gauteng (in some calendar years), the estimated births were generally higher than the registered live births in all the provinces. While except for KwaZulu-Natal and Eastern Cape (in 2011) the result shows that the Gompertz estimates were slightly higher than the RSM estimates and reported live births in 2011 and 2016 respectively. Although insignificant, these patterns are possible and therefore consistent, as studies suggest that the RSM can sometimes over or underestimate fertility levels, especially when disaggregated (Ahuejere, 2021; Sandra and Kreyenfeld, 2015; Ong'aro, 2014; Lima et al., 2018).

Northern Cape had the highest level of completeness from 2002–2016 overtime except for Free State in 2004, where it stood at 87,5%. The province reported completeness levels above 100% between 2004–2012, especially in the fifth year of registration. In using similar method, Nannan et al. (2016) also found some provinces reporting completeness levels higher than the national average and some exceeding 100%. The authors attributed these patterns to children migrating “early in life from their province of birth to the province in which their birth was registered” (Nannan et al., 2019:5). Also, this might be due to the issues of certainty and a small and manageable population size, which presents an advantage in terms of management of birth registrations and coverage compared to that of other provinces (Garenne et al., 2016; Stats SA, 2021).

Overall, the study revealed patterns suggesting that the contribution of late registration to completeness levels reduces with time. Also, that the South African completeness level is high and near universal – implying that the CRVS system is well developed compared to that of other African countries. However, more can still be achieved, as there are still room for improvement.

9. Conclusion

Patterns revealed from the study suggest that completeness levels in South Africa is high and on the increasing trajectory. These are evident especially within the first calendar year. These improvements were achieved by excellent organization of the civil registration and vital statistics system in the country. Overall, the results imply that South Africa's completeness levels are near universal. However, there are still room for improvement, especially at the sub-national level.

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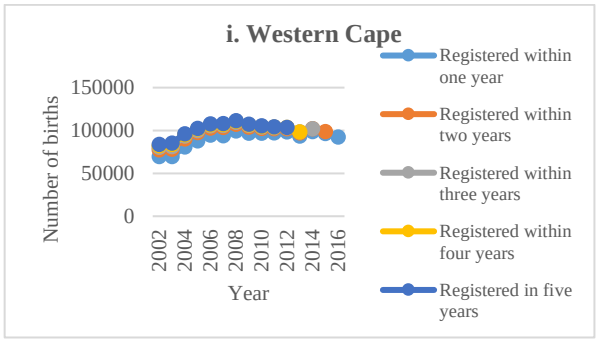
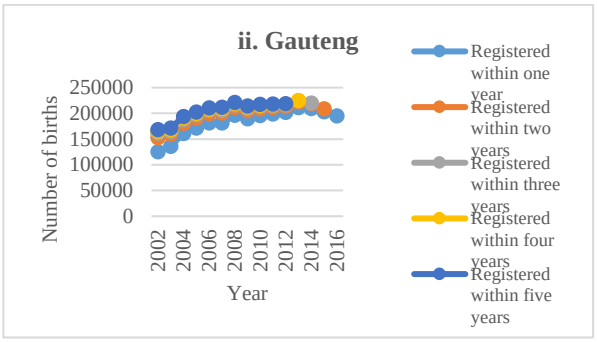
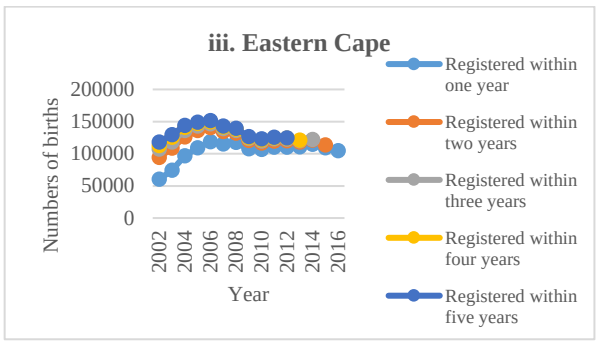
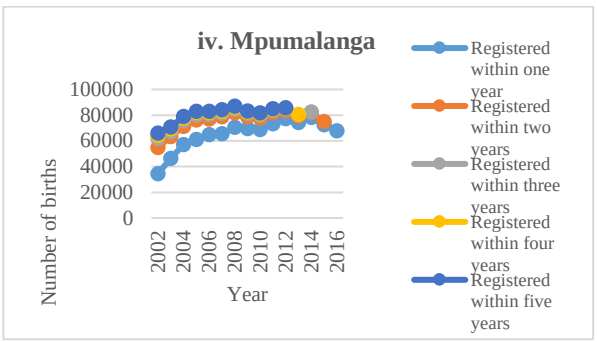
Appendix

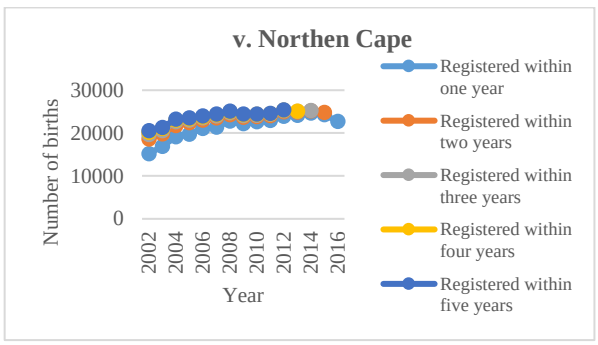
Figure 3: (i-ix): Births registration by calendar year and time of registration (in numbers), provinces, 2002–2016

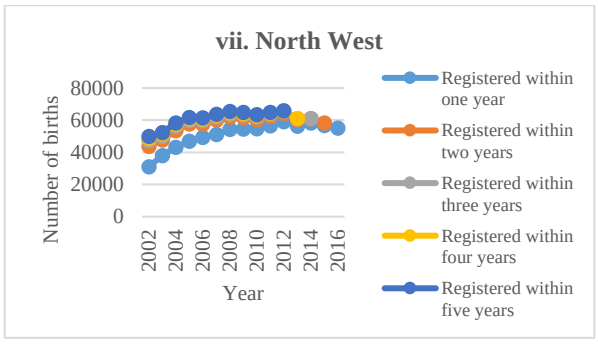


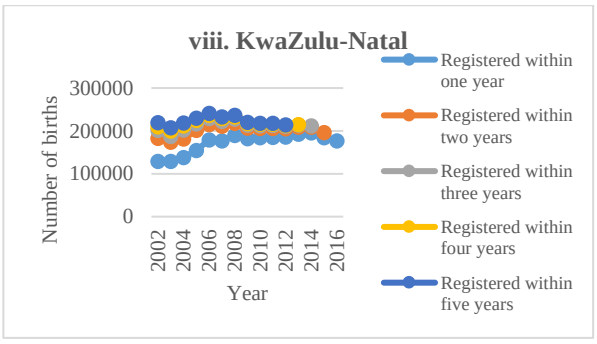












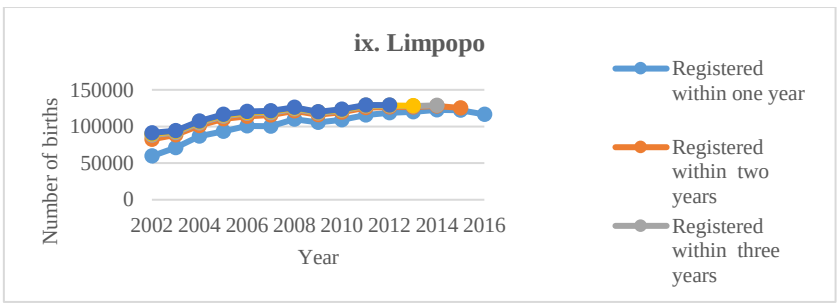
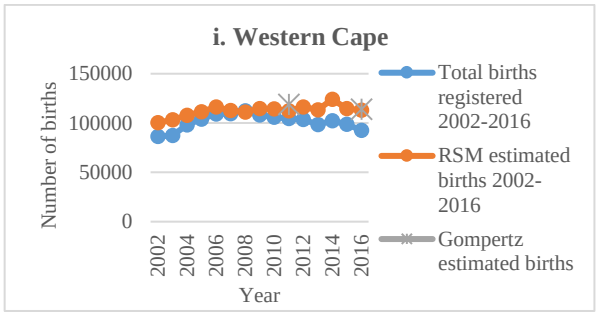
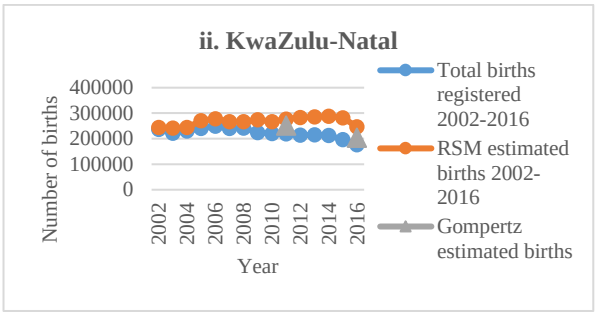
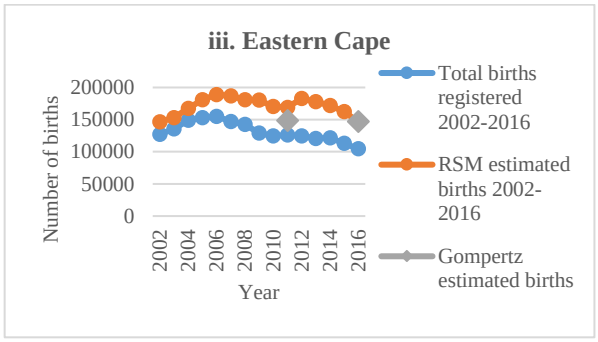
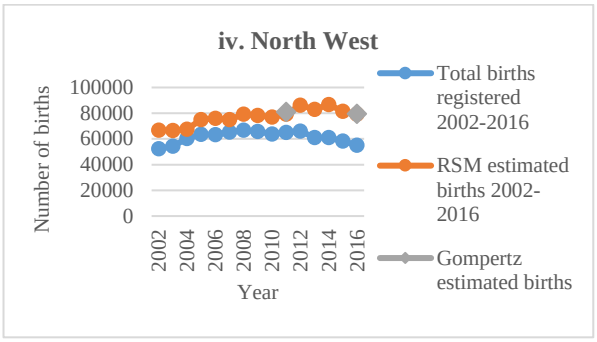


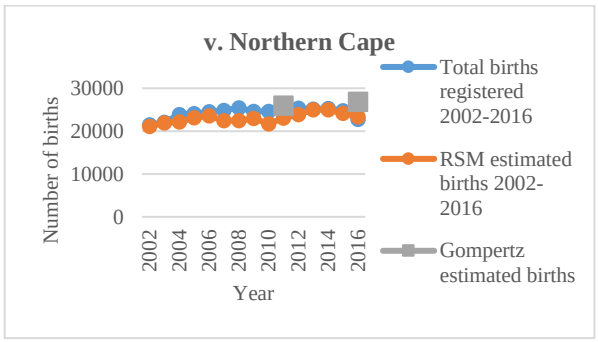
Figure 4: (i-ix): Estimated and registered births (RSM, Gompertz and CRVS) by province, 2002–2016

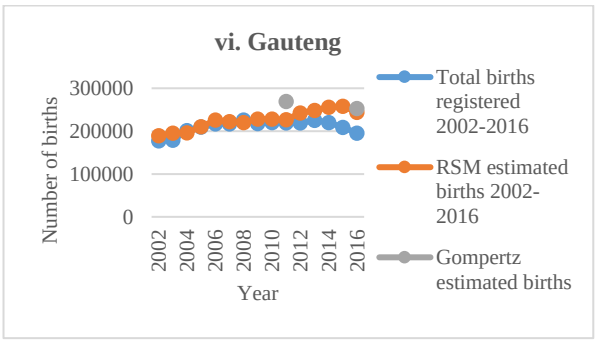


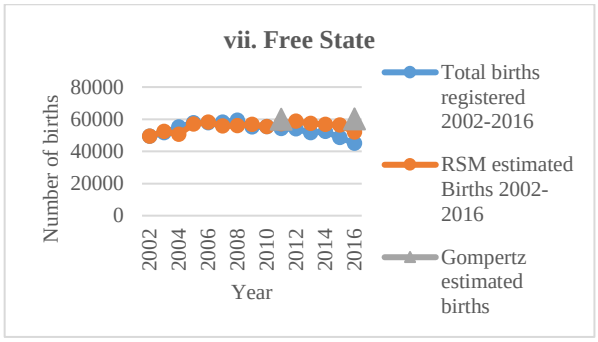


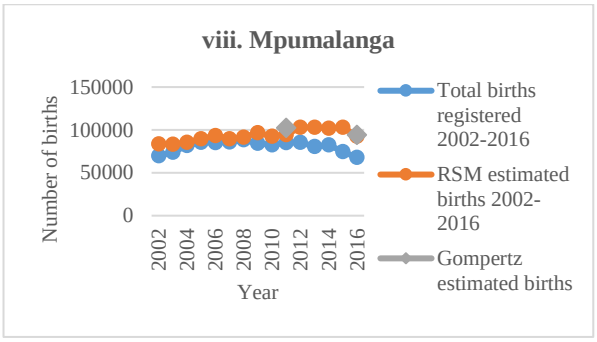












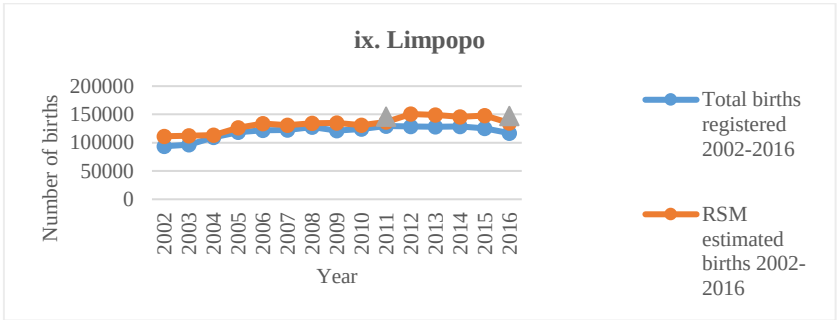
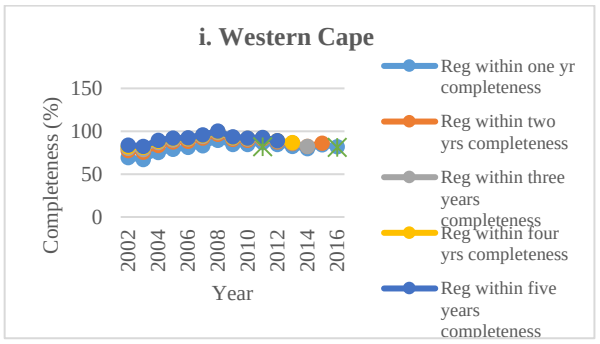
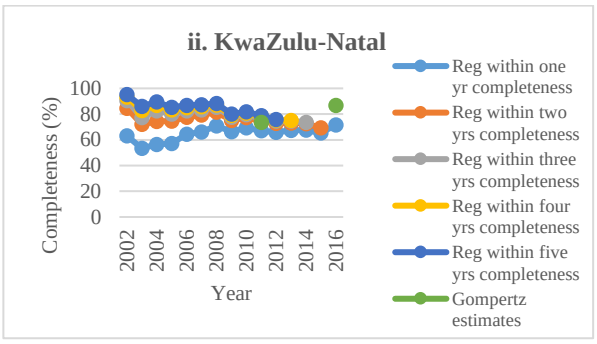
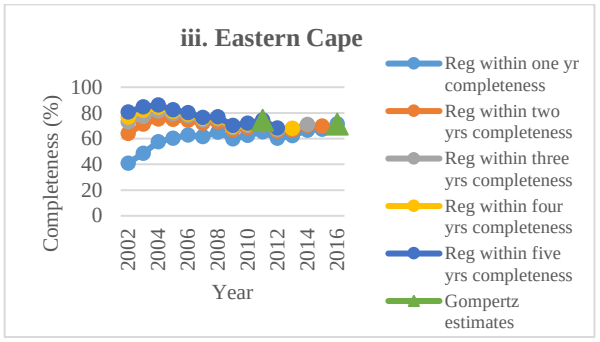
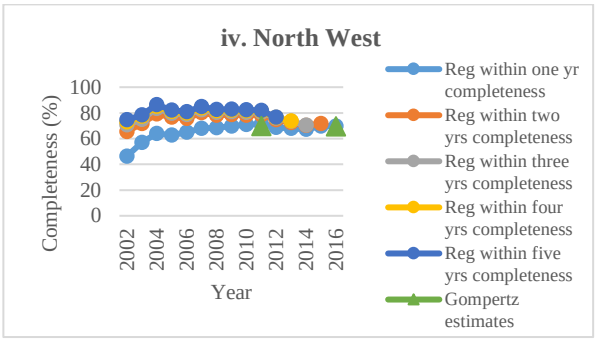
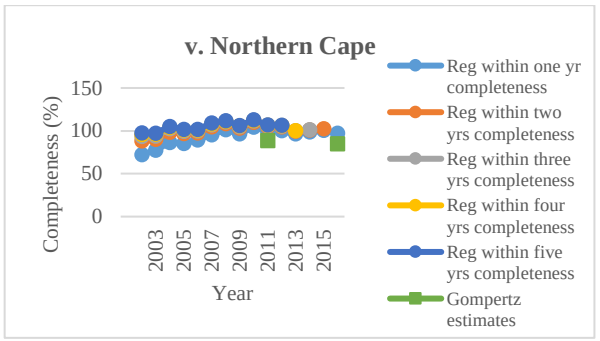
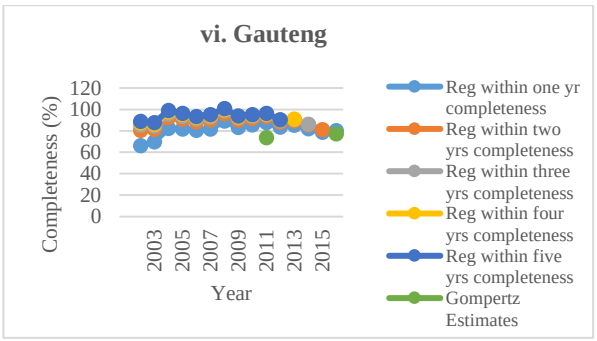
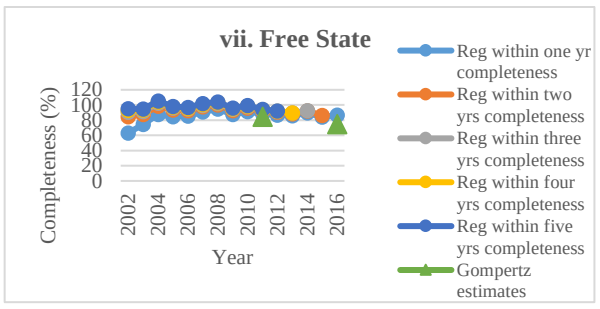
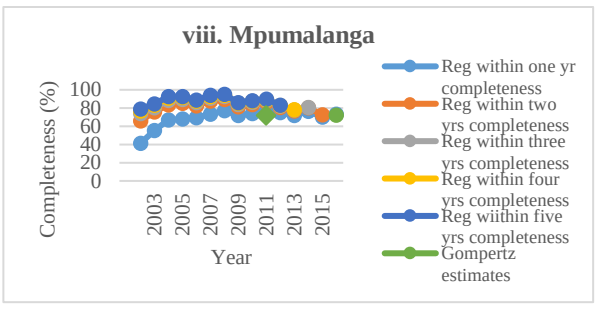
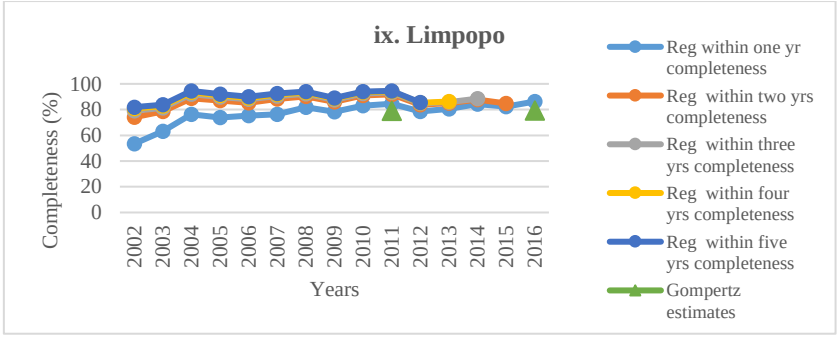



Figure 5: (i-ix): Estimated completeness levels of birth registration by year, time of registration and province, RSM and Gompertz, 2002–2016