

MONTHLY REPORT ON WEEKLY NUMBERS OF DEATHS IN SOUTH AFRICA

DECEMBER 2024

(TO EPIWEEK 52)

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South African Medical Research Council
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UCT Centre
for Actuarial
Research

Glossary:

Actual number of deaths: The actual number of deaths in South Africa have been estimated from the numbers recorded on the National Population Register. We use weighting factors set to produce results consistent with those of the annual Rapid Mortality Surveillance Report to account for deaths of persons who are not on the National Population Register as well as those that have not been registered with the Department of Home Affairs. The adjustments to account for incompleteness of recording of deaths on the National Population Register were re-estimated taking into account the 2017 cause-of-death data released by Stats SA in 2021.

Epi-week: We report by an 'Epi-week' consistent with CDC and many NICD reports which run from Sunday to Saturday, ensuring continuity of weeks from one year to the next. Each week is aligned with the 'Epiyear' that has 4 or more days in that week. Week 53 of 2020 is from 27 December 2020 to 2 January 2021, Week 1 of 2021 is 3 January – 9 January 2021, Week 1 of 2022 is 2 January – 8 January 2022 and Week 1 of 2023 is 1 January – 7 January 2023.

Predicted number of deaths: The predicted number of weekly deaths have been revised after an investigation into the underlying trends in mortality prior to 2020. They are now modelled on data from the period **2015-2019** rather than for the period 2014-2019. A single negative binomial model has been used for unnatural deaths allowing for age and sex. Negative binomial models have been fitted for each province in 10-year age groups from 5 years of age, allowing for different historical trends in each age group. In contrast, for <1 year and 1-4 years, the predicted numbers were set to the average rates for 2015–2019 were continued. The predicted numbers for each component have been summed to give the total.

P-score: The P-Score is frequently used to describe excess mortality. It is the percentage change in the number of deaths from the expected number for that week. Negative values below 0% reflect a deficit in deaths while positive values reflect an increase.

General warning: The Department of Home Affairs faces sporadic temporary office closures for various reasons. Closure may cause a delay in the processing of the death registration which would result in an underestimate of the deaths in the most recent weeks.

Background

The series of reports on weekly deaths in South Africa, based on data from the National Population Register provided to the SAMRC started in March 2020. A time series approach was used to estimate the predicated number of deaths to calculate the excess. For 2022, a negative binomial modelling approach was introduced which took into account estimates of the population. With growing uncertainty about the estimate of the counterfactual (predicted) numbers of deaths and the need to allow for the impact of the epidemic on the size of the population (particularly at the older ages), a careful evaluation of the trends in mortality rates since 2014 was undertaken.

This evaluation indicated that it would be better to exclude the data for 2014 from the models as the numbers of deaths in 2014 were substantially higher than those of 2015–2019. Secondly, it was noted that rates of change in mortality differed by age group. The predicted numbers of weekly deaths for 2020 – 2023 have been estimated using new models together with population estimates for 2020 – 2023 based on data from the pre-COVID period 2015–2019 and have been extended with population estimates to provide predicted values for 2024.

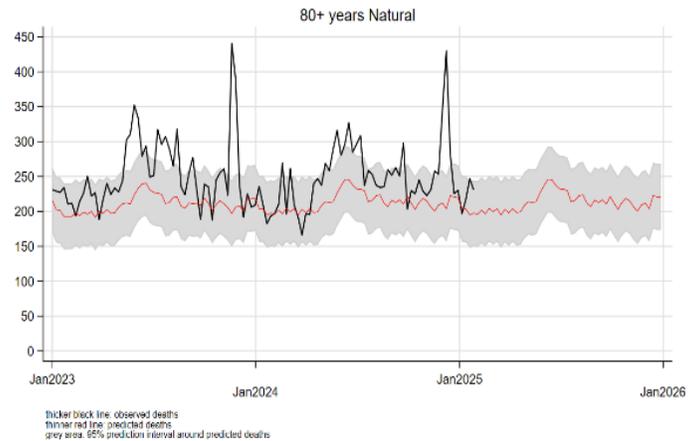
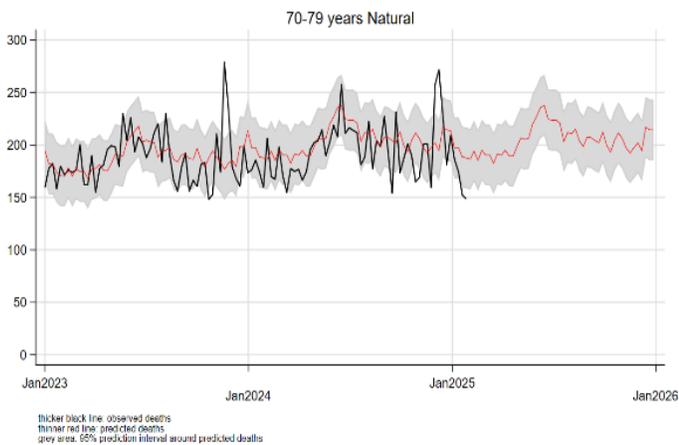
Briefly, the predicted values for the weekly deaths are based on negative binomial models for natural deaths for each province for 10-year age groups (to deal with digit preference in the deaths) from 5-years of age allowing for age-specific trends. For child deaths <1 year and 1-4 years, the average deaths rates for 2015 – 2019 were continued. Deaths in the 10-year age groups have been redistributed to the component five-year age groups in proportion to mortality increases between the 2 five-year age groups from model life table (Coale & Demeny West level 20) up to the age group 35-44. The apportionment for age group 35-44 was applied to all the older age groups.

This monthly report provides estimates of the weekly number of deaths of all persons in South Africa up to the end of epidemiological **Week 52 of 2024**, covering the period **January 2020** till **28 December 2024**. It reports national estimates for all causes of death as well as natural and unnatural causes. The report also presents natural deaths by significant age groups and the provincial estimates for all-cause deaths as well as the sex-age group breakdown for natural deaths.

We have added a section at the end where we reflect briefly on the annual trends and patterns of reported deaths in South Africa over the five-year period 2020-2024 when compared with the baseline expected deaths. The baseline expected deaths have been estimated by extrapolating the trends in mortality rates (by age, and sex, and province) observed in the pre-Covid era (2015-2019) applied to our best estimate of the population size in those groupings. With each year of extrapolation, our uncertainty (even though not quantifiable) as to those mortality rates increases; likewise the population numbers are derived from standard demographic projection techniques that were complicated by the impact of Covid-19.

Trends in December 2024

- The weekly numbers of deaths exceeded the upper uncertainty bound in **Weeks 49 and 50**.
 - There was an excess of 820 deaths during **Week 49 (1 – 7 December 2024)** with numbers being high in **Gauteng, Limpopo and KwaZulu-Natal**, associated with increases in older ages.
 - During **Week 50 (8-14 December 2024)** there was an excess of 1570 deaths. Deaths from natural causes were very high in **Limpopo and KwaZulu-Natal** but **North West, Mpumalanga, Northern Cape and Gauteng** were also high. The increase was in the older age groups, particularly in the very old (80+ years).
 - The graphs below show that the spikes in deaths from natural causes among older persons in **Limpopo** province in December 2024 were also experienced in 2023. In addition, the 80+ year age group experienced higher numbers of deaths during the winters of both 2023 and 2024.



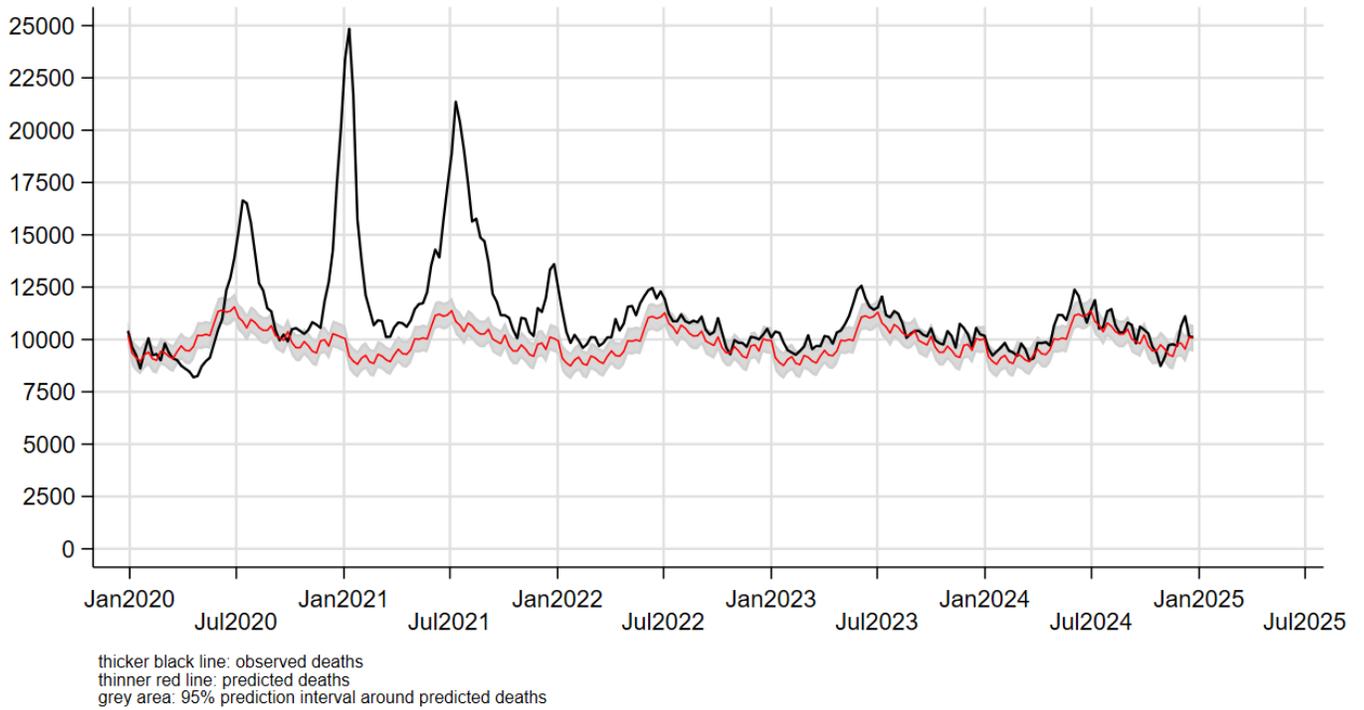
- The **Eastern Cape** experienced a growing number of deaths from unnatural causes: excess deaths grew from **60** in **Week 49** to **80** in **Week 50** and continued to increase to **163** deaths in **Week 52**. In contrast, unnatural deaths tracked within the uncertainty bounds for other provinces and fell below the bounds in **Mpumalanga**.

Trends from 2020 - 2024

- This report includes an overview of the annual numbers of deaths observed during the five-year period 2020-2024. Compared with predicted numbers (based on the mortality rates experienced during the pre-COVID years 2015-2019), proportional excess mortality from all causes has decreased from 37% in 2021 to 4% in 2024.
 - The burden of Covid-mortality fell particularly heavily on those over the age of 40 in 2020 and 2021. Since 2021, the pattern of excess mortality from natural causes by age and sex was somewhat erratic, with somewhat higher excess mortality among males (especially those aged 20-39) than females, and persistent higher mortality than expected among those (of both sexes) aged over 80.
 - In contrast, the unnatural deaths were lower than expected in 2020, reverting to the predicted number in 2021 and increasing by 10% in 2022. By 2024, the number of unnatural deaths were about 2% higher than predicted but can be expected to increase slightly as once late registrations have been included.

RSA weekly deaths from all causes

29 December 2019 to 28 December 2024

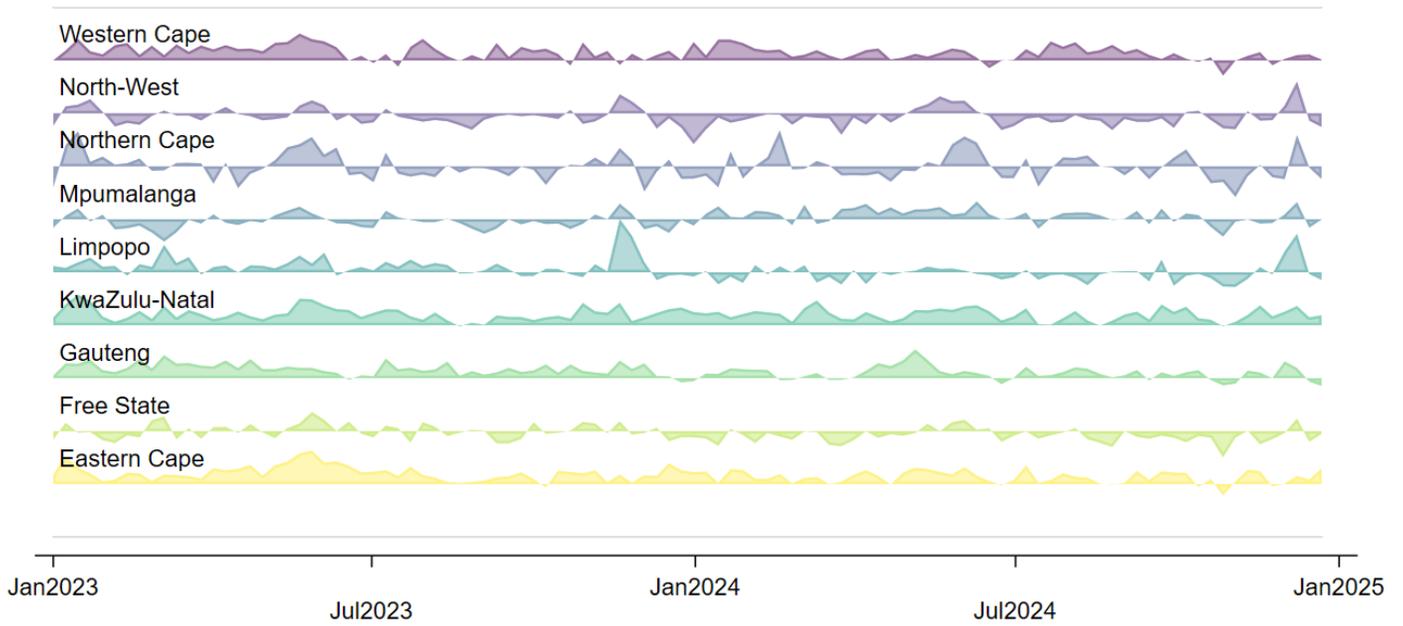


Numbers have been scaled to the estimated actual number of deaths

All-cause deaths by province

p-score for weekly deaths in South Africa from all causes by province

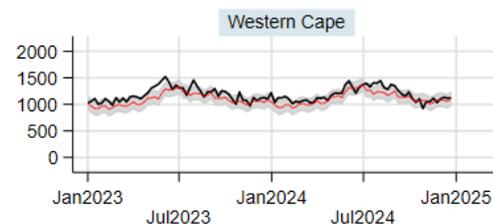
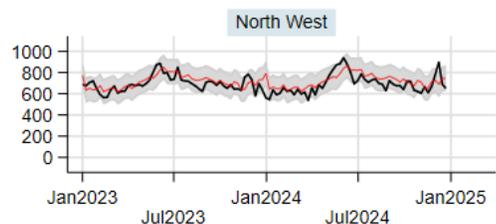
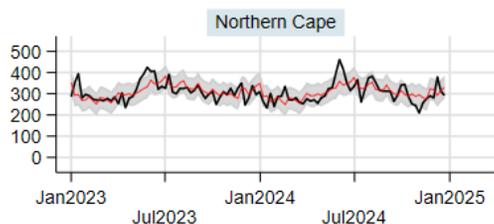
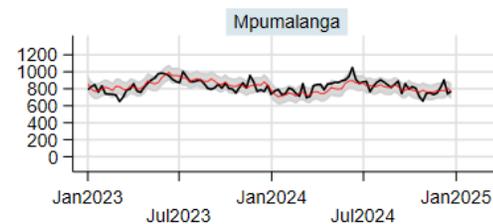
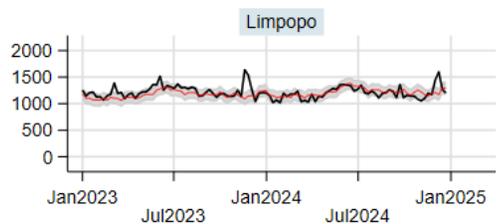
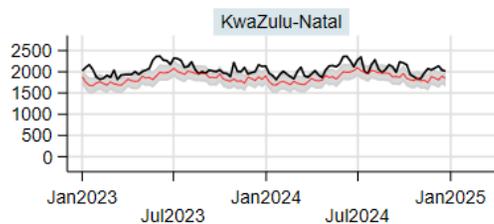
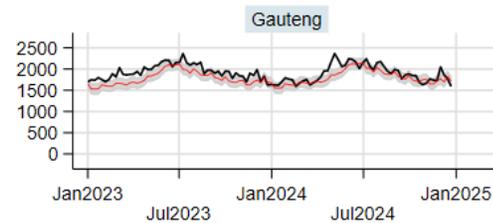
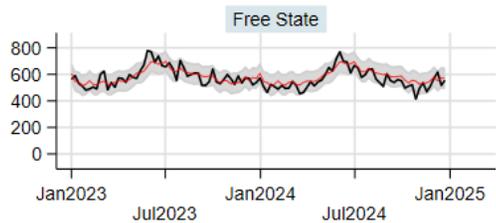
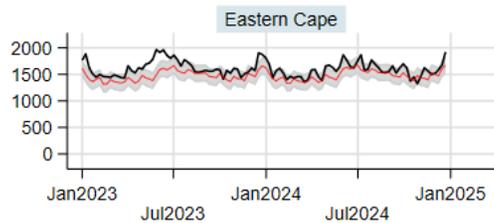
1 January 2023 to 28 December 2024



Y-axis: each vertical increment represents 50% above or below predicted

Deaths from all causes, by province

1 January 2023 to 28 December 2024

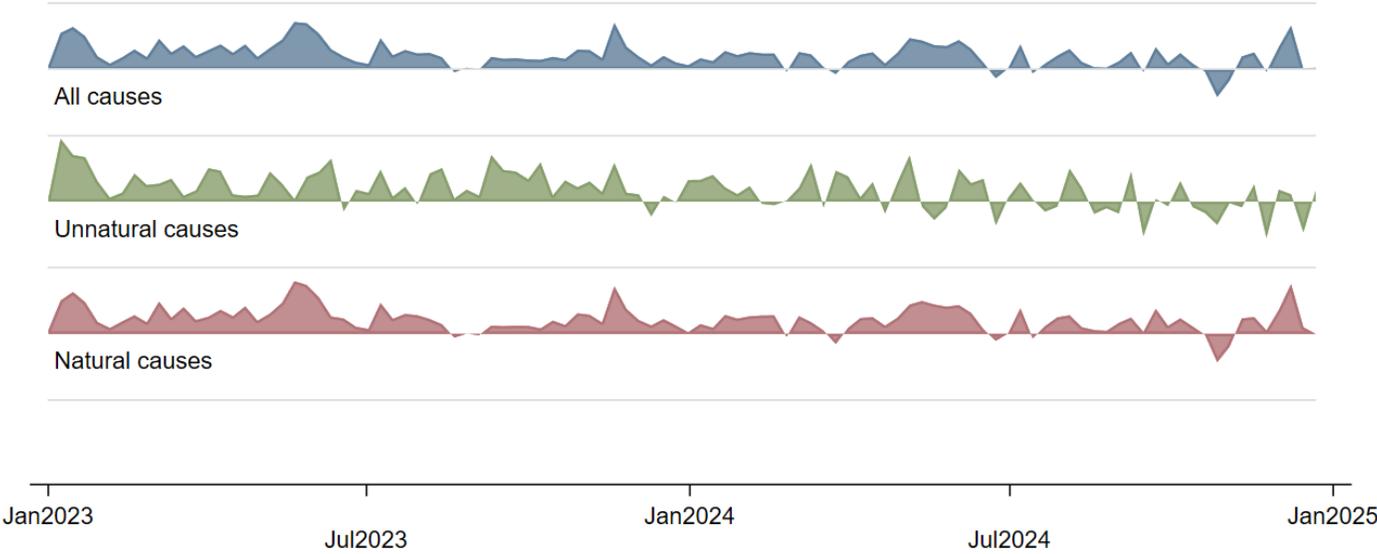


thicker black line: observed deaths
thinner red line: predicted deaths
grey area: 95% prediction interval around predicted deaths

Numbers have been scaled to the estimated actual number of deaths

Natural and unnatural deaths

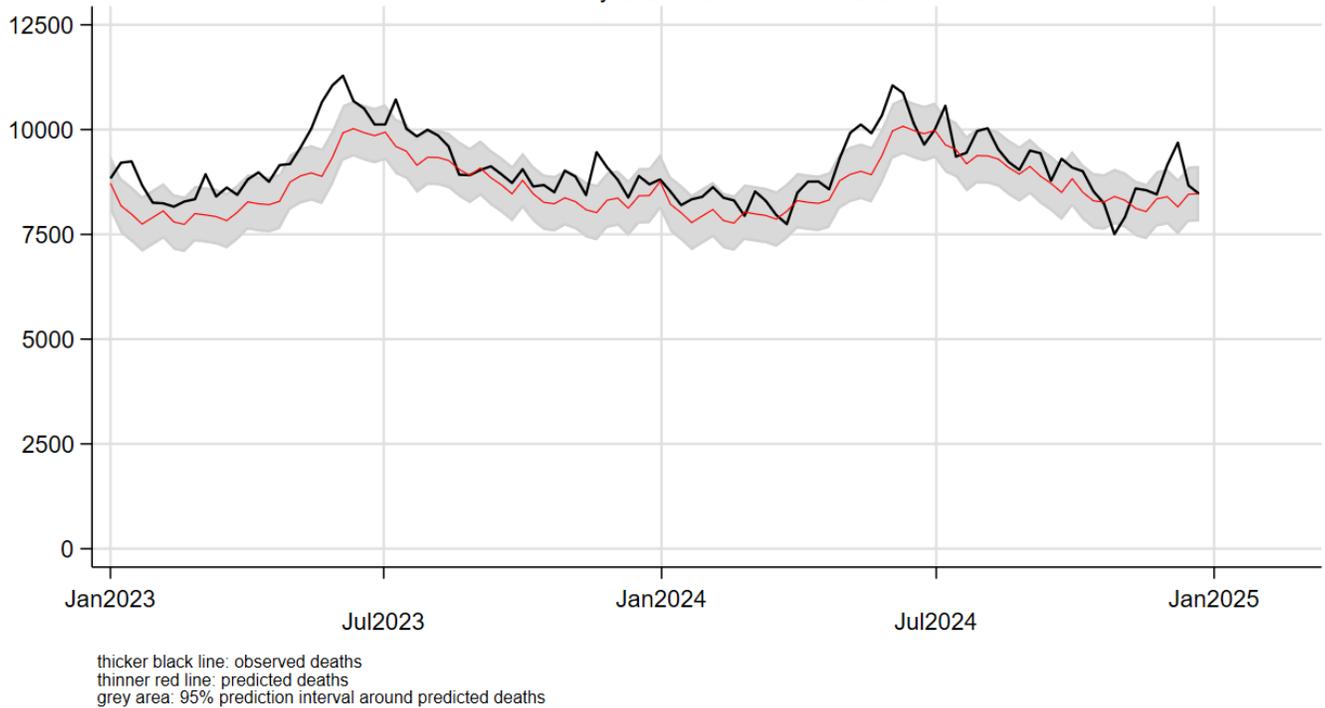
p-score for weekly deaths in South Africa by cause
1 January 2023 to 28 December 2024



Y-axis: each vertical increment represents 25% above or below predicted

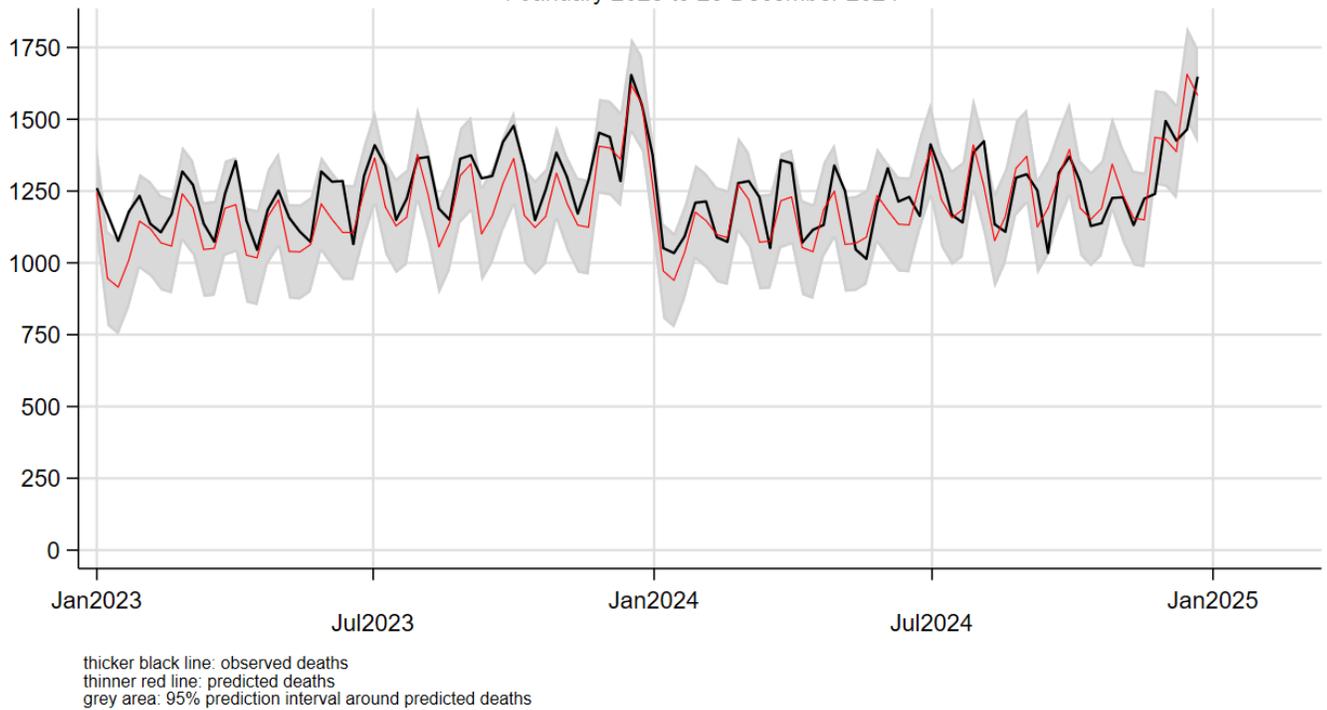
RSA weekly deaths from natural causes

1 January 2023 to 28 December 2024



RSA weekly deaths from unnatural causes

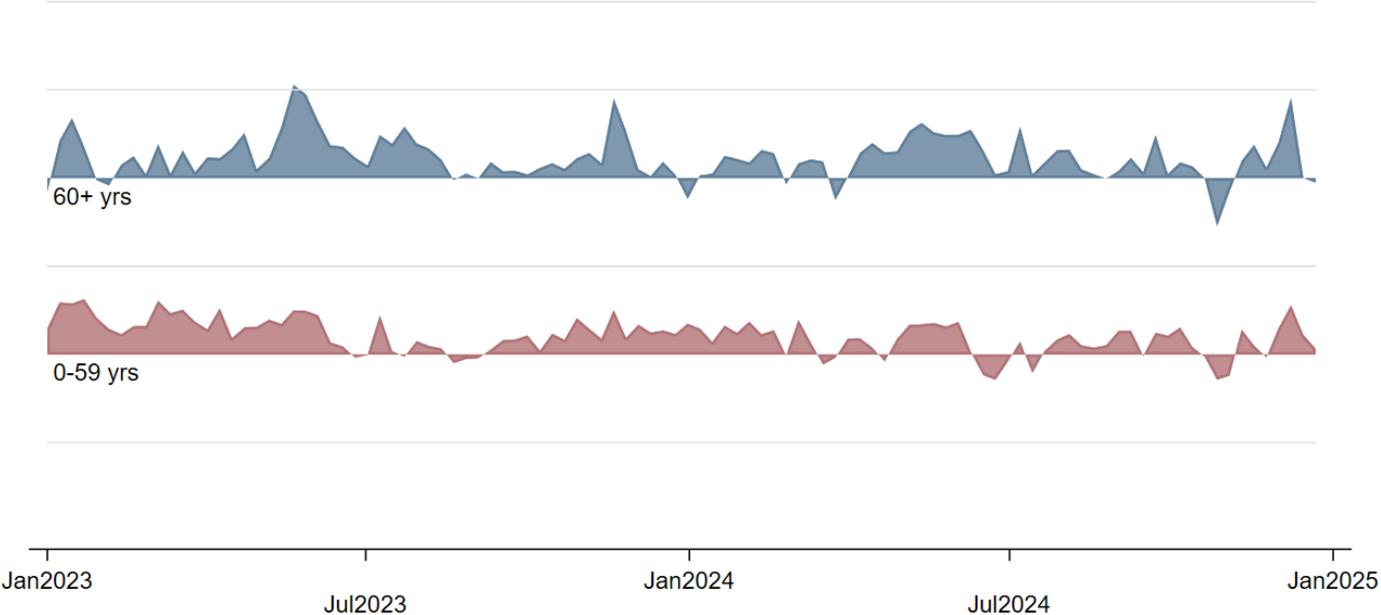
1 January 2023 to 28 December 2024



Numbers have been scaled to the estimated actual number of deaths

Natural deaths by broad age groups

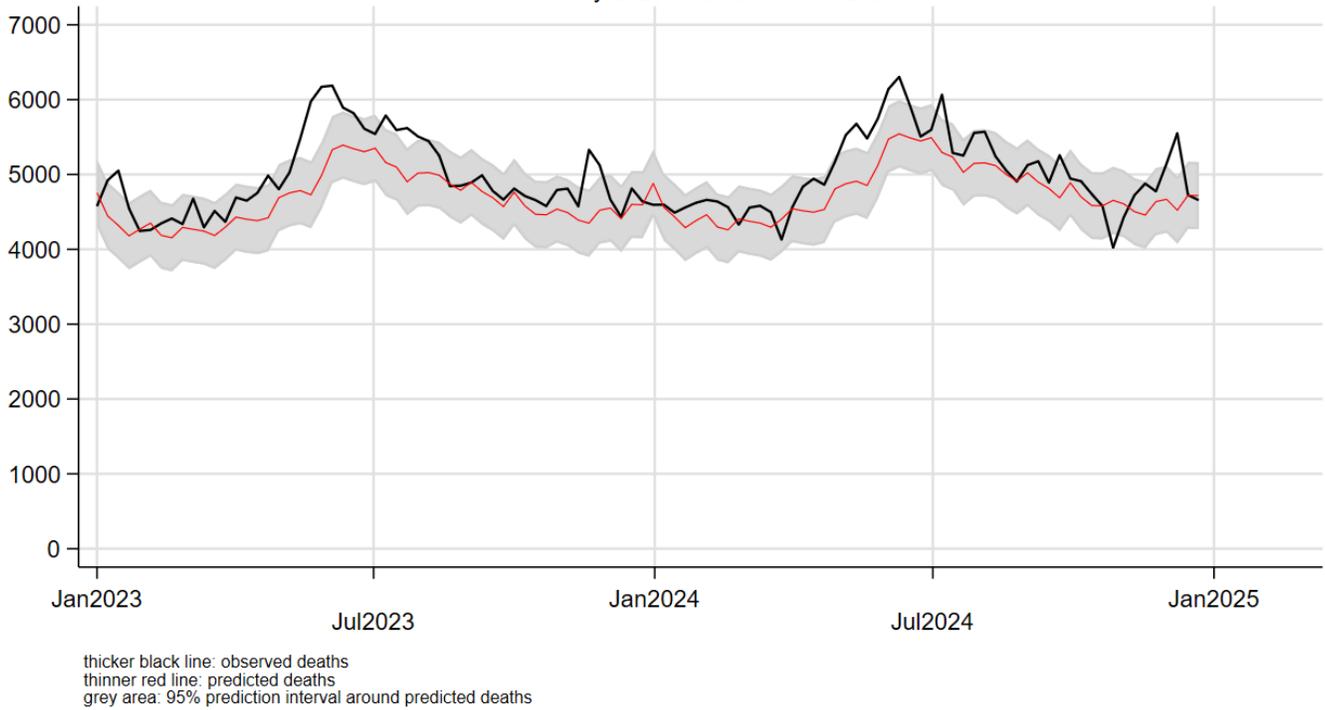
p-score for weekly deaths in South Africa from natural causes by broad age group
1 January 2023 to 28 December 2024



Y-axis: each vertical increment represents 25% above or below predicted

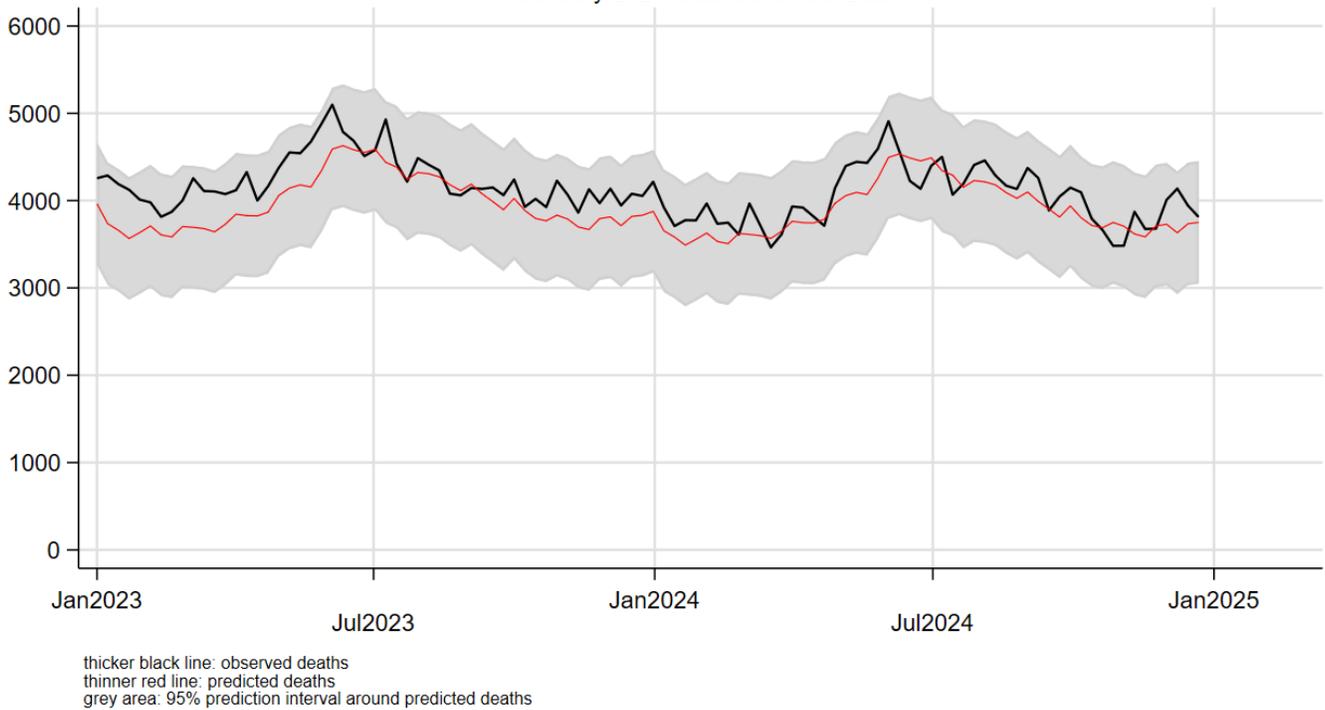
RSA weekly deaths from natural causes : 60+ years

1 January 2023 to 28 December 2024



RSA weekly deaths from natural causes : 0-59 years

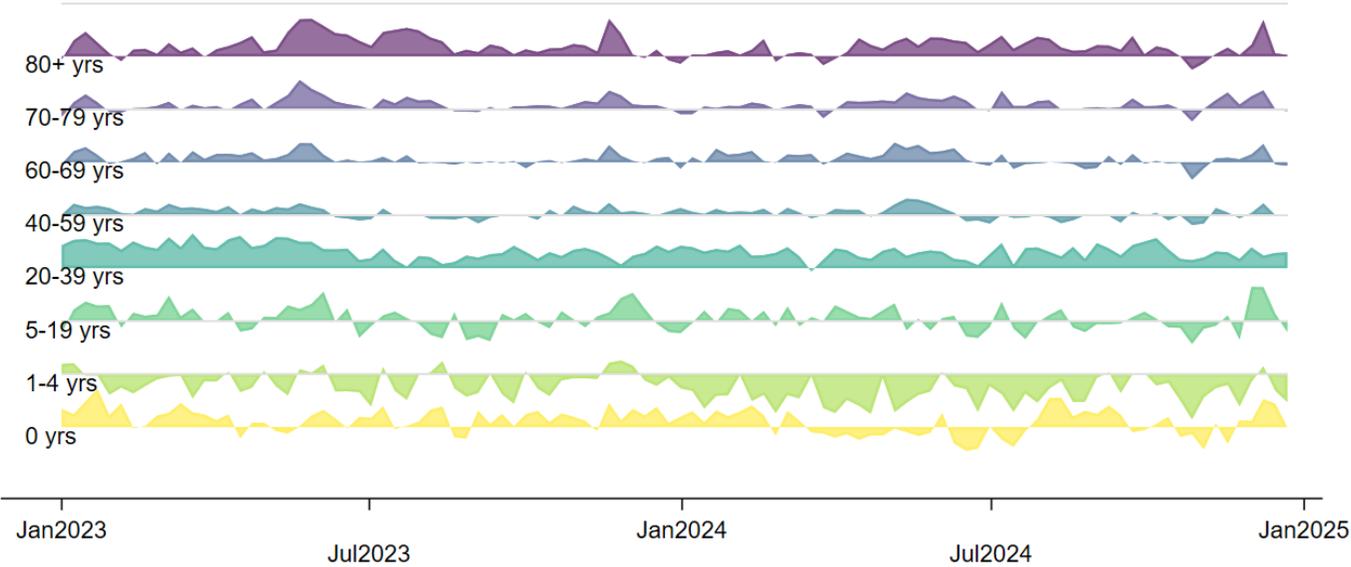
1 January 2023 to 28 December 2024



Numbers have been scaled to the estimated actual number of deaths

Natural deaths by age group

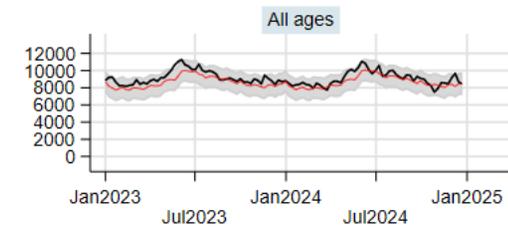
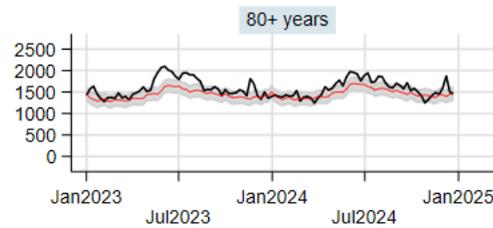
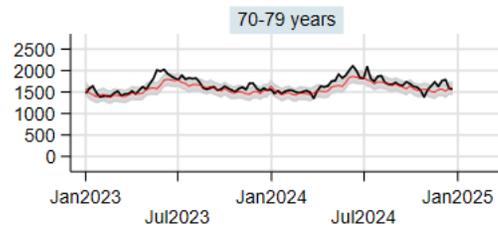
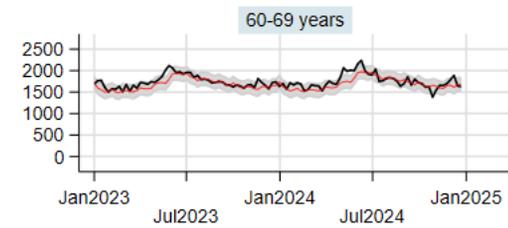
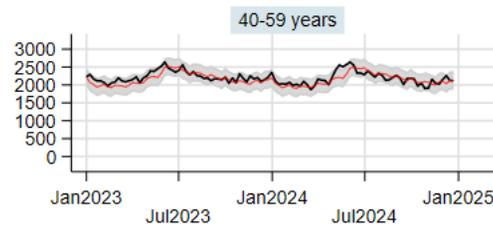
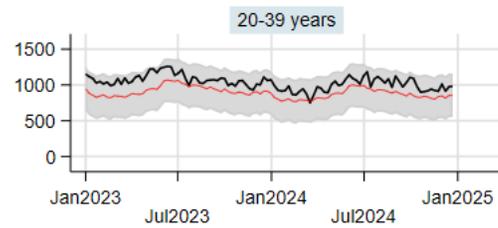
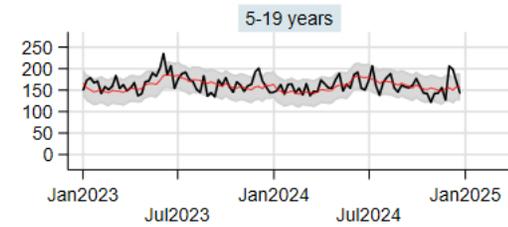
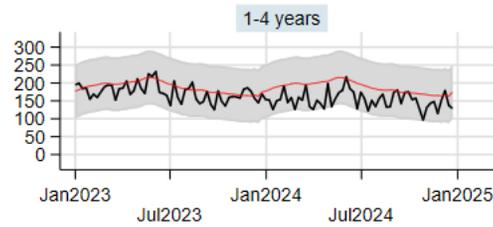
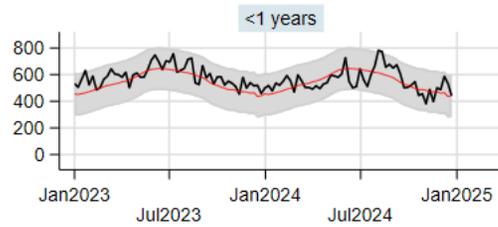
p-score for weekly deaths in South Africa from natural causes by age group
1 January 2023 to 28 December 2024



Y-axis: each vertical increment represents 50% above or below predicted

RSA weekly deaths from natural causes, by age group

1 January 2023 to 28 December 2024

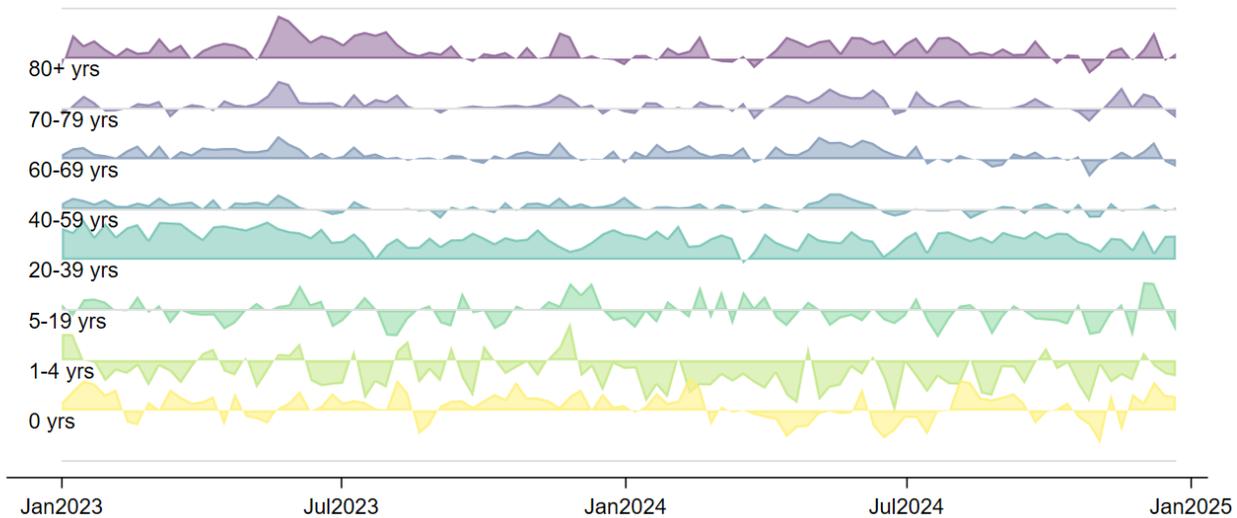


thicker black line: observed deaths
thinner red line: predicted deaths
grey area: 95% prediction interval around predicted deaths

Numbers have been scaled to the estimated actual number of deaths

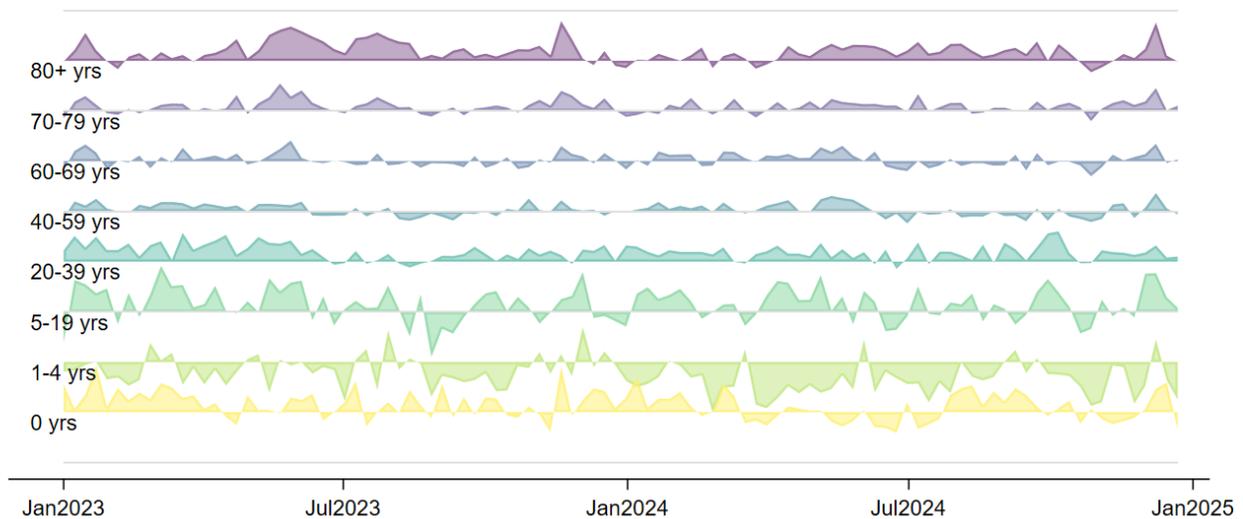
Natural deaths by sex and age group

p-score for male weekly deaths in South Africa from natural causes by age group
1 January 2023 to 28 December 2024



Y-axis: each vertical increment represents 50% above or below predicted

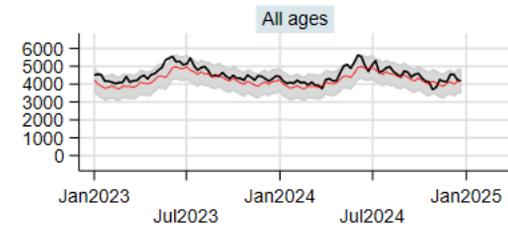
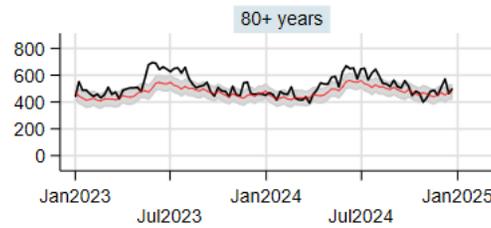
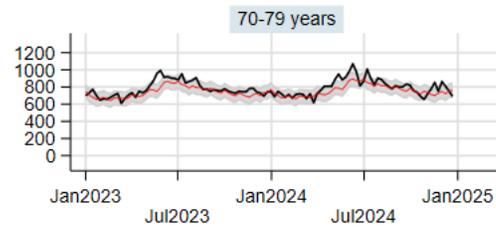
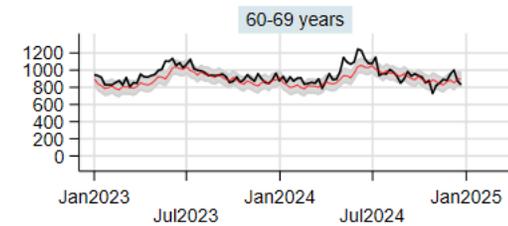
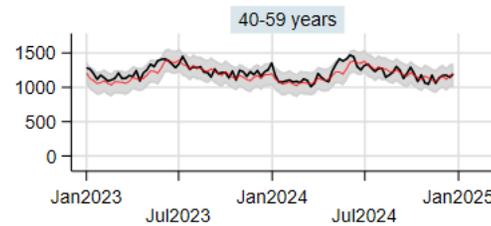
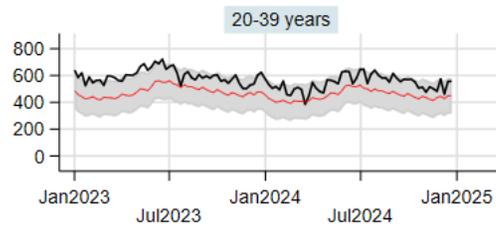
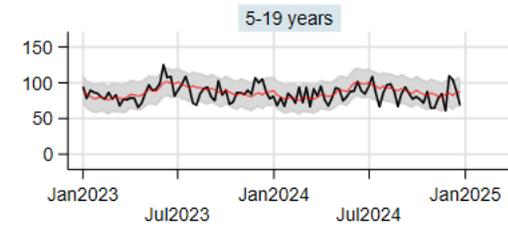
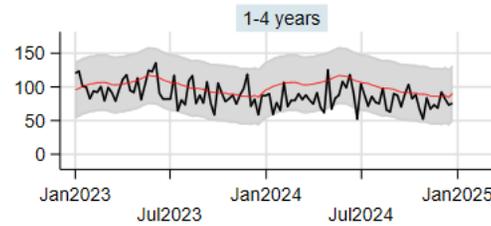
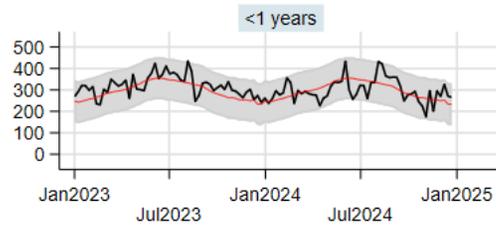
p-score for female weekly deaths in South Africa from natural causes by age group
1 January 2023 to 28 December 2024



Y-axis: each vertical increment represents 50% above or below predicted

Males: Natural deaths, by age group

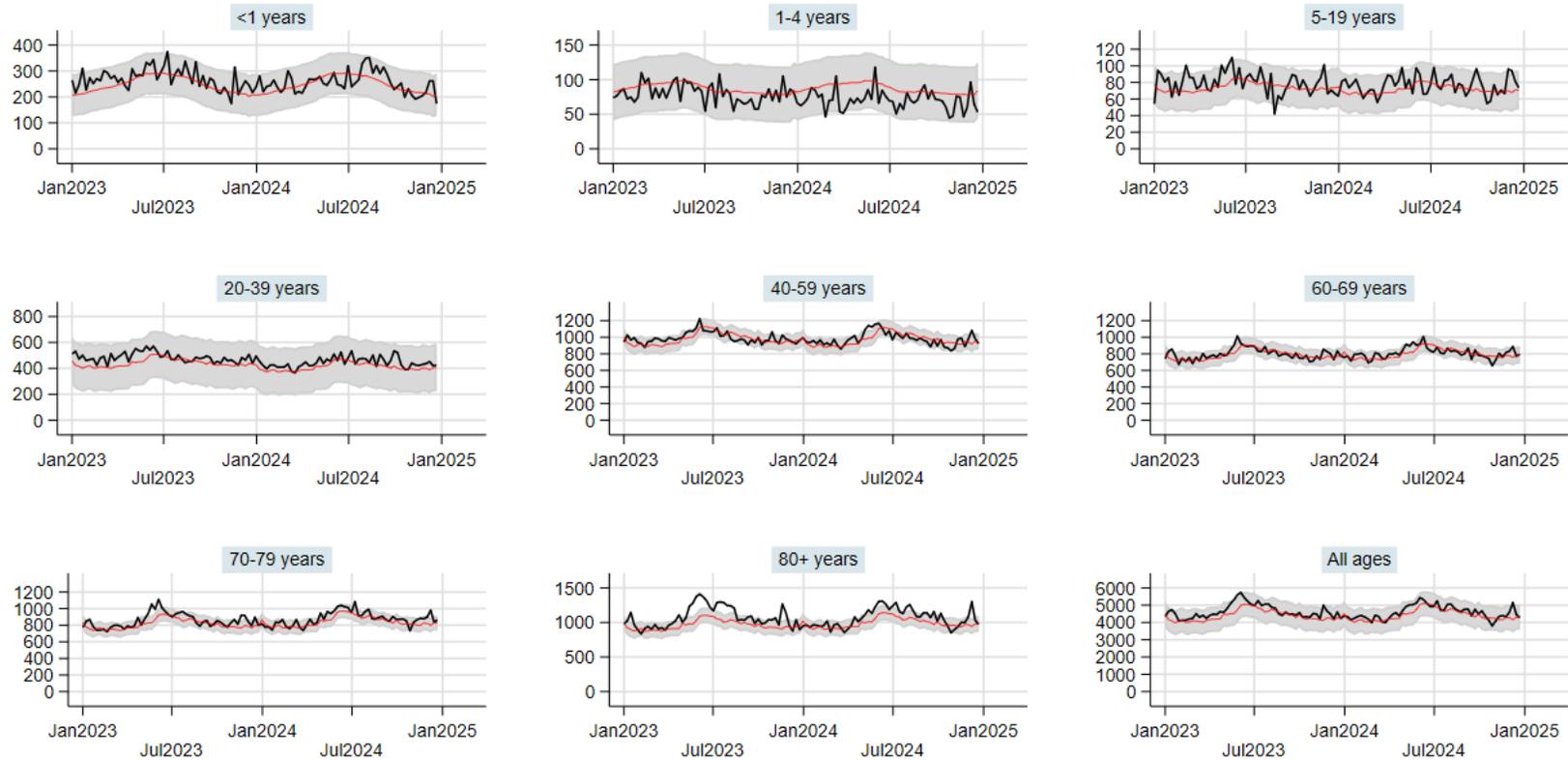
1 January 2023 to 28 December 2024



thicker black line: observed deaths
 thinner red line: predicted deaths
 grey area: 95% prediction interval around predicted deaths

Numbers have been scaled to the estimated actual number of deaths

Females: Natural deaths, by age group 1 January 2023 to 28 December 2024



thicker black line: observed deaths
 thinner red line: predicted deaths
 grey area: 95% prediction interval around predicted deaths

Numbers have been scaled to the estimated actual number of deaths

Review of deaths in South Africa, 2020-2024

Table 1 shows the numbers of total deaths (all cause) and natural deaths by sex for each of the four epi-years from 2020-2024¹. The predicted numbers are based on an extrapolation of the mortality trends (by age, and sex, and province) observed in the pre-Covid era (2015-2019) applied to our best estimate of the population size in those groupings. The observed number of deaths was somewhat higher than the predicted in 2020 and increased to more than 700 000 in 2021. Table 2 and The impact of Covid-19, particularly in 2021, is evident: in that year, natural deaths were 42% higher than expected; 38% higher for males and 46% for females. In 2024, deaths from all causes were 4% higher than expected. In contrast, the unnatural deaths were lower than expected in 2020, reverting to the predicted number in 2021 and increased by 10% in 2022. By 2024, the number of unnatural deaths were about 2% higher than predicted but can be expected to increase slightly once late registrations have been included.

We are alert to the possibility that the extrapolation of the expected baselines, based on the mortality rates during 2015-2019, may have resulted in an exaggerated decrease in the predicted numbers in natural deaths 5 years and older. In addition, the predicted numbers are also dependent on the population estimates.

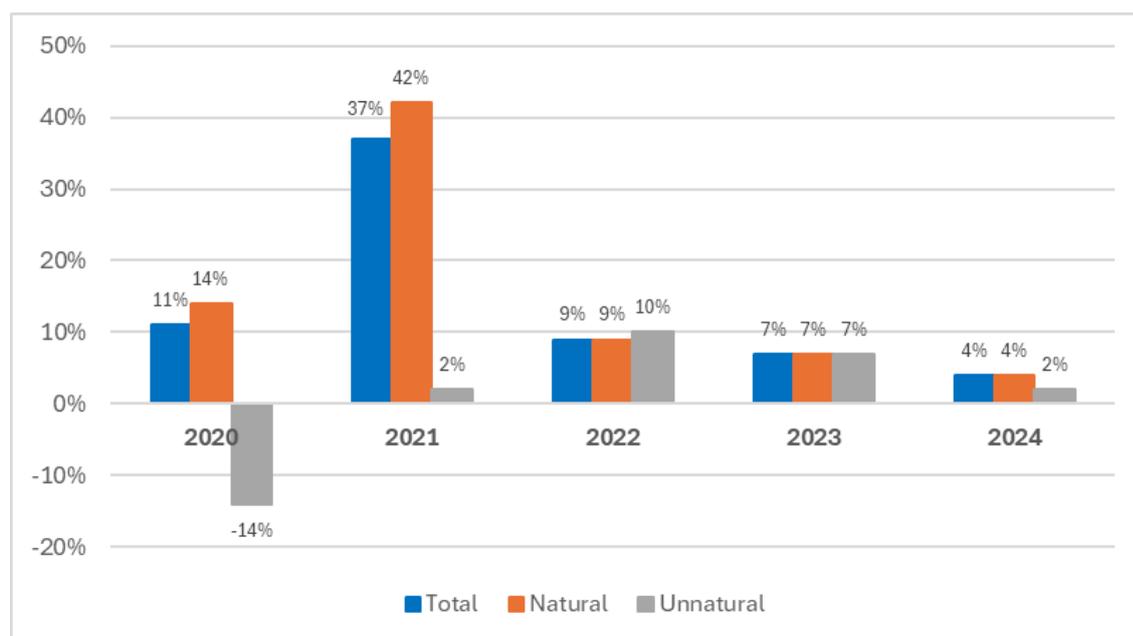


Figure 1 show the proportional excess mortality in each year which has decreased from 37% in 2021 to 4% in 2024.

Table 1: Observed and predicted deaths from all causes and from natural causes by sex, South Africa 2020-2024

Total deaths	Natural deaths		
	Both Sexes	Both Sexes	Females
		Males	

¹ An epi-year runs for the 52 (or 53 in some calendar years) weeks beginning on the Sunday in December or January with four or more days in that week falling in January, up to and including the last week beginning on the last Sunday in December with three or fewer days in that week falling in January.

Epi-year	Observed	Predicted	Observed	Predicted	Observed	Predicted	Observed	Predicted
2020	588 952	532 428	537 692	473 150	259 113	233 551	278 579	239 599
2021	705 354	513 670	644 977	454 715	309 829	224 557	335 148	230 158
2022	555 024	509 059	488 995	448 907	242 768	221 255	246 227	227 652
2023	544 359	510 302	478 721	448 714	237 557	220 667	241 164	228 047
2024	534 086	513 624	469 999	450 597	231 953	220 845	238 046	229 752

Table 2: Proportional excess mortality from all causes and from natural causes by sex, South Africa 2020-2024

Epi-year	Total deaths		Natural deaths		
	Both Sexes		Both Sexes	Males	Females
2020		11%	14%	11%	16%
2021		37%	42%	38%	46%
2022		9%	9%	10%	8%
2023		7%	7%	8%	6%
2024		4%	4%	5%	4%

The impact of Covid-19, particularly in 2021, is evident: in that year, natural deaths were 42% higher than expected; 38% higher for males and 46% for females. In 2024, deaths from all causes were 4% higher than expected. In contrast, the unnatural deaths were lower than expected in 2020, reverting to the predicted number in 2021 and increased by 10% in 2022. By 2024, the number of unnatural deaths were about 2% higher than predicted but can be expected to increase slightly once late registrations have been included.

We are alert to the possibility that the extrapolation of the expected baselines, based on the mortality rates during 2015-2019, may have resulted in an exaggerated decrease in the predicted numbers in natural deaths 5 years and older. In addition, the predicted numbers are also dependent on the population estimates.

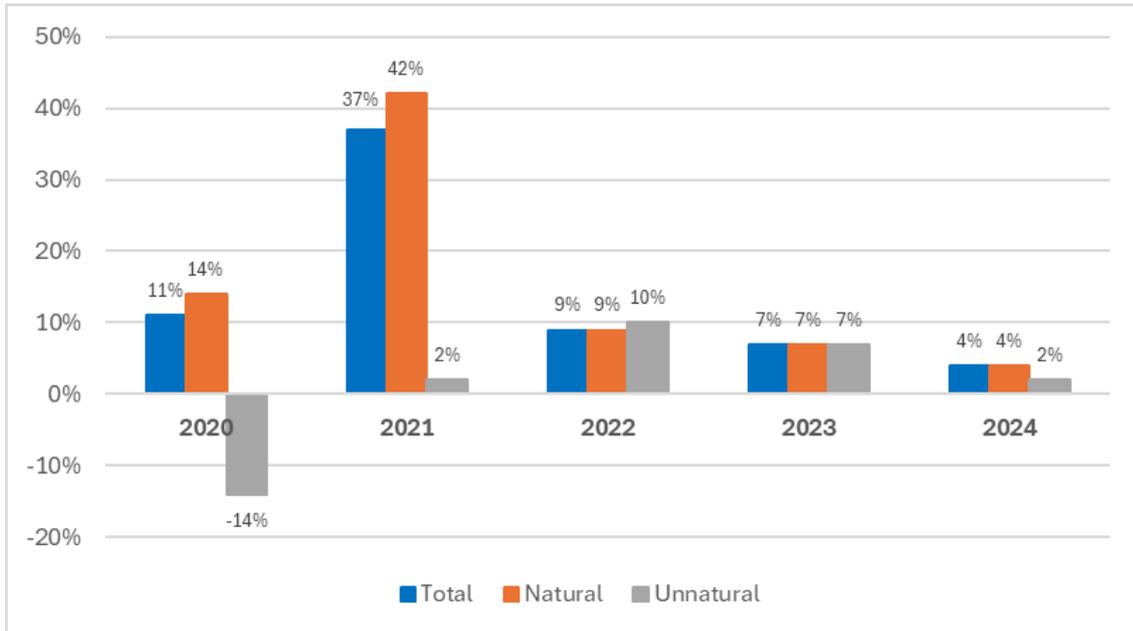


Figure 1: Percent excess mortality by cause and year, South Africa 2020-2023

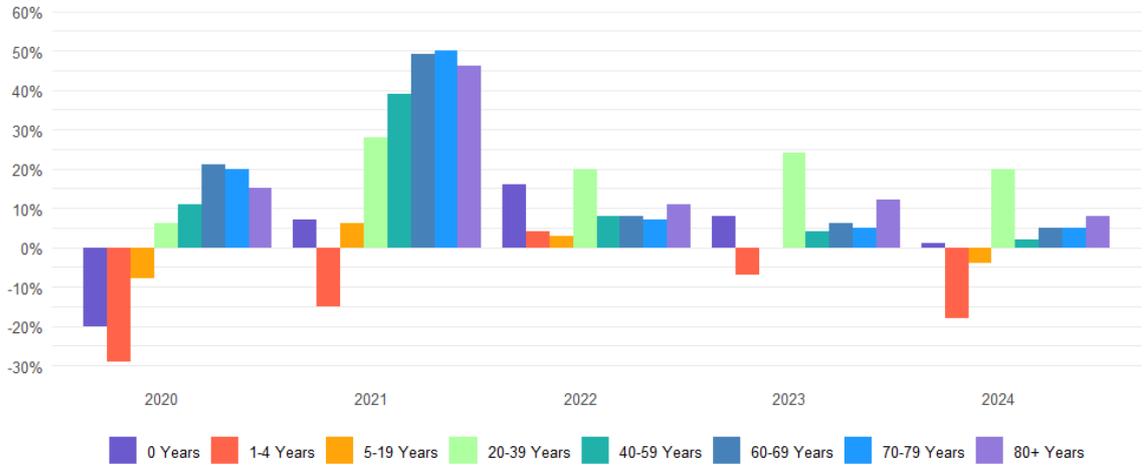
The annual excess deaths from natural causes are reviewed further by age and sex. Table 3 shows the numbers of observed and expected deaths from natural causes, by age and sex, in South Africa from 2020-2024 and Table 4 the proportional excess mortality respectively.

As can be seen from Figure 2, the burden of Covid-mortality fell particularly heavily on those over the age of 40 in 2020 and 2021. Younger children experienced somewhat lighter mortality in 2020 and 2021, a feature largely attributable to the attenuating effects of lockdowns on the transmission of communicable diseases among those under the age of 5.

Since 2021, the pattern of excess mortality by age and sex was somewhat erratic, with somewhat higher excess mortality among males (especially those aged 20-39) than females, and persistent higher mortality than expected among those (of both sexes) aged over 80. Again, as noted, this may well be an artifice of the extrapolation of mortality rates rather than a real phenomenon. Unfortunately, timely cause of death data are not available to provide definitive information about the reasons for the observed excess mortality. Investigations into the spatio-temporal patterns and comparison with other surveillance data such as influenza and RSV trends and climate related information such as heat waves, will be helpful to interpret the excess deaths, but it remains critical that South Africa revamps the death registration system to enable more rapid access to the medical cause of death information.

Figure 2: Percent excess mortality from natural causes by age group and sex, South Africa 2020-2024

Males



Females

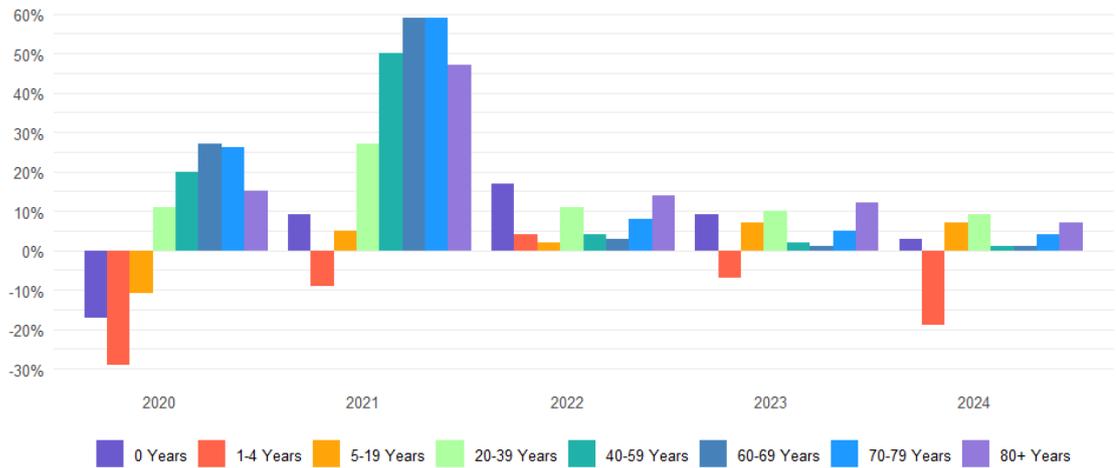


Table 3: Observed and predicted deaths from natural causes by age group for males and females, South Africa 2020-2024

MALES (Natural deaths)																
Epi-year	0 years		1-4 years		5-19 years		20-39 years		40-59 years		60-69 years		70-79 years		80+ years	
	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.
2020	12 664	15 794	3 824	5 376	4 232	4 614	32 243	30 304	74 818	67 481	56 239	46 373	44 705	37 267	30 387	26 341
2021	16 532	15 506	4 454	5 260	4 780	4 505	36 058	28 076	89 097	64 328	67 287	45 236	55 116	36 697	36 506	24 948
2022	17 820	15 424	5 476	5 252	4 620	4 507	31 691	26 476	67 766	62 844	48 858	45 440	39 754	37 226	26 783	24 087
2023	16 586	15 382	4 856	5 220	4 519	4 526	31 048	24 946	64 168	61 855	48 805	46 078	40 340	38 400	27 234	24 260
2024	15 465	15 382	4 261	5 220	4 310	4 501	28 236	23 472	62 282	61 235	49 058	46 728	41 466	39 505	26 874	24 801

FEMALES (Natural deaths)																
Epi-year	0 years		1-4 years		5-19 years		20-39 years		40-59 years		60-69 years		70-79 years		80+ years	
	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.	Obs.	Pred.
2020	10 902	13 098	3 300	4 662	3 852	4 320	32 163	28 979	64 968	54 345	51 015	40 239	51 366	40 821	61 013	53 135
2021	14 096	12 897	4 158	4 560	4 320	4 102	33 784	26 519	78 378	52 193	63 055	39 636	63 796	40 099	73 560	50 152
2022	15 033	12 865	4 705	4 545	4 065	3 978	27 443	24 700	53 619	51 368	41 336	40 140	43 897	40 765	56 129	49 291
2023	14 054	12 853	4 186	4 522	4 153	3 866	25 226	22 976	51 630	50 818	41 499	40 897	44 457	42 183	55 958	49 932
2024	13 241	12 853	3 673	4 522	3 986	3 715	23 178	21 327	50 806	50 314	42 089	41 582	45 738	43 884	55 336	51 555

Table 4: Percent excess deaths from natural causes by age group for males and females, South Africa 2020-2024

MALES (Natural deaths)								
Epi-year	0 years	1-4 years	5-19 years	20-39 years	40-59 years	60-69 years	70-79 years	80+ years
2020	-20%	-29%	-8%	6%	11%	21%	20%	15%
2021	7%	-15%	6%	28%	39%	49%	50%	46%
2022	16%	4%	3%	20%	8%	8%	7%	11%
2023	8%	-7%	0%	24%	4%	6%	5%	12%
2024	1%	-18%	-4%	20%	2%	5%	5%	8%

FEMALES (Natural deaths)								
Epi-year	0 years	1-4 years	5-19 years	20-39 years	40-59 years	60-69 years	70-79 years	80+ years
2020	-17%	-29%	-11%	11%	20%	27%	26%	15%
2021	9%	-9%	5%	27%	50%	59%	59%	47%
2022	17%	4%	2%	11%	4%	3%	8%	14%
2023	9%	-7%	7%	10%	2%	1%	5%	12%
2024	3%	-19%	7%	9%	1%	1%	4%	7%