Technical Note:
Developing scenarios for long-term population growth in SSA

To inform discussions about the long-term importance of small fertility changes in the near term, Track20 developed a series of projections to explore hypothetical changes in fertility. These scenarios were intended to provide illustrative, and largely hypothetical results, to help make key points about the importance of even small changes in fertility.
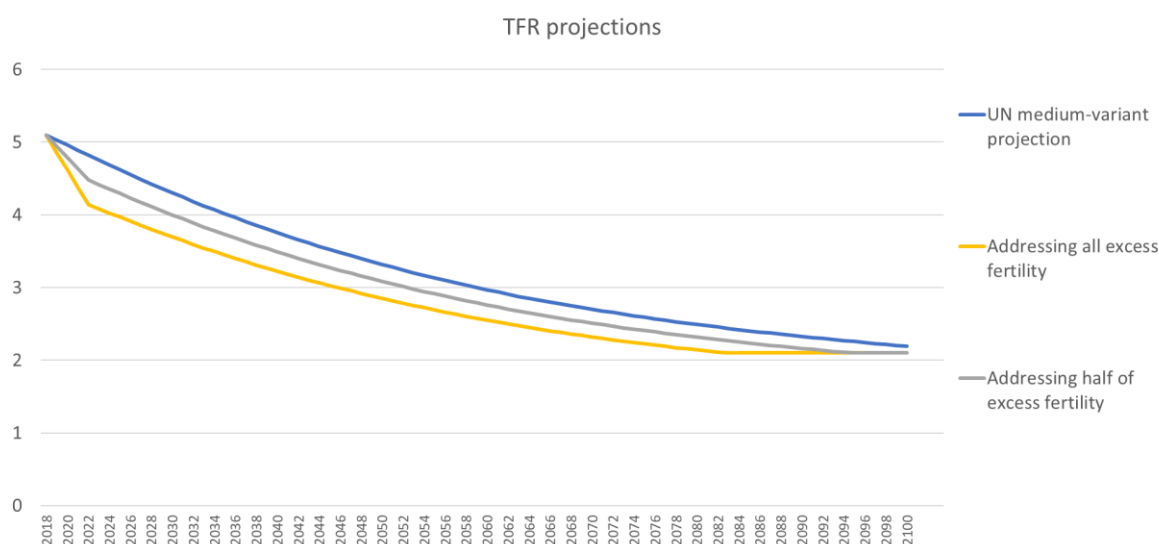
I. UN median variant

The projection discussed here serves as the baseline and is aligned to the UN median variant for Sub-Saharan Africa using estimates and projections from World Population Prospects 2017 Revision (WPP2017).[i]

II. Reducing unwanted fertility

This projection was developed to show what would happen if current TFR reductions were accelerated to address existing unwanted fertility. Analysis of 39 DHS surveys[ii] (the most recent survey available in each SSA country) was conducted to examine differentials between estimated TFR and Wanted TFR. The Wanted Total Fertility Rate (WTFR) is calculated in exactly the same way as the conventional TFR, except that the numerator is confined to births that are less than or equal to the number that respondents report as having been desired.[iii]

The difference between the estimated TFR and the Wanted TFR is referred to here as 'excess fertility'. Across the 39 countries, excess fertility ranged from 0.2 (Niger 2012 DHS) to 1.9 (Burundi 2016/17 DHS). The weighted average (based on number of births) across the 39 surveys was 0.68—the value used to create the projections.

Two variants from the UNPD median-estimate of TFR in Sub-Saharan Africa were created; one assuming that all excess fertility was addressed in the next 5 years, and the other assuming that half of excess fertility was addressed in the next 5 years. To do this, the projected TFR in 2022 was adjusted downwards by 0.68 (for addressing all excess fertility) and 0.34 (for addressing half of excess fertility). A linear trend was created between the 2018 TFR and the adjusted 2022 TFR. For the period 2023 to 2100, the median variant TFR was scaled based on the ratio of TFRs in 2022. However, declines were limited so that TFR did not go below replacement levels (2.1). The resulting TFR trends are shown below.

TFR projections

III. Shift away from early births

This projection examines the long-term impact of shifting away from early births—even if there was no change to the median TFR projection. Here TFR is kept equal to the UN Medium Variant but the age-distribution of births is changed. The current age distribution of births for Sub-Saharan Africa is used as a starting point (based on UNPD WPP 2017). Then the distribution in 2023 is changed to reflect the current age distribution of births for Asia, where there are few adolescent births and most births are concentrated in age groups of 25+. A linear trend from 2018 to 2023 is created, then this new distribution is held constant from 2023 to 2100. The graphs below show the change in birth distribution based on current projections (UNPD) versus the projection with the more rapid shift away from early births.
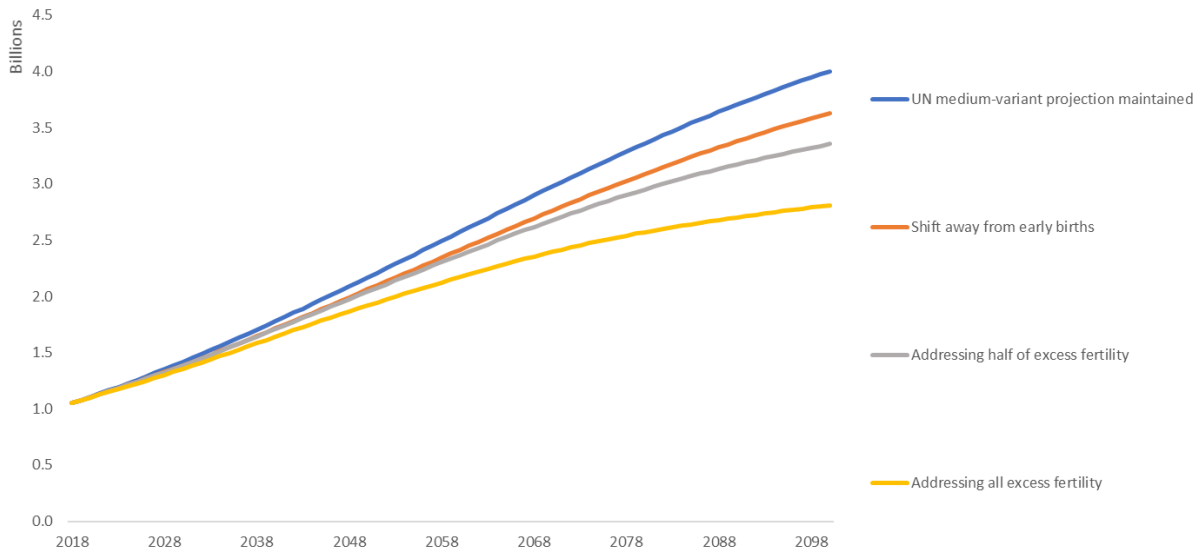

Projected age distribution of births (UNPD)

Shift away from early births
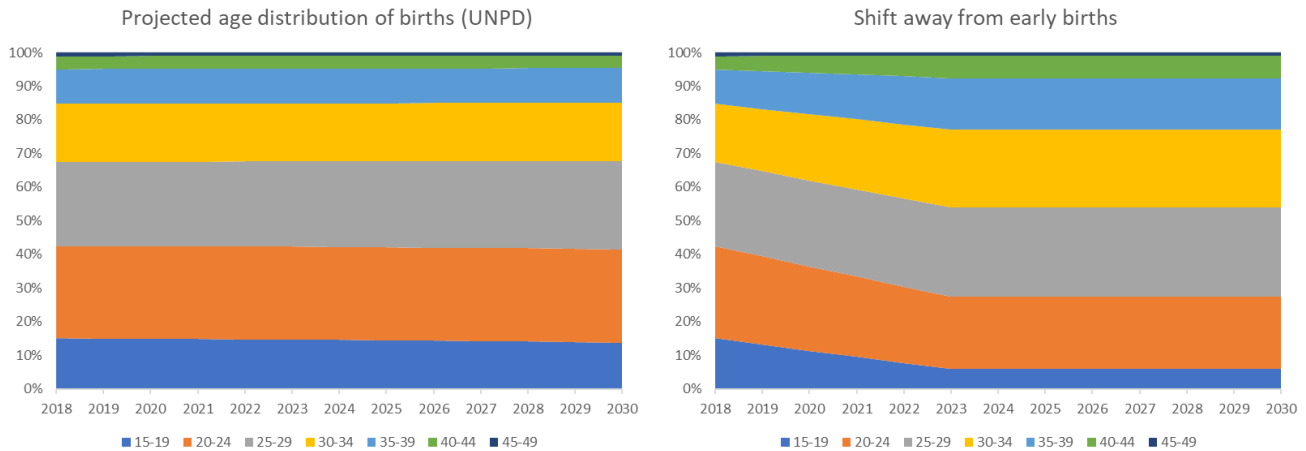
IV. Creating population projections

All projections were run using the DemProj module of Spectrum, a cohort-component projection model.[iv] Projections were run for the region of Sub-Saharan Africa as a whole with a base year of 2018 and projecting to 2100 (annual estimates produced for each interim year). The baseline projection was created using data from the UNPD WPP2017 for Sub-Saharan Africa.   For the variant projections described above, all other assumptions were kept the same as the baseline projection aside from the changes to TFR and the age-distribution of births shown.

While the DemProj model starts with all inputs from the UNPD medium-variant, the projection methodology used to project forward the population to 2100 differs to the UNPD methodology. DemProj uses a deterministic cohort-approach, while the UNPD uses a probabilistic projection. Therefore, the projected total population results within DemProj differ somewhat from the published population projections from UNPD. In 2100, DemProj projects a total population in Sub-Saharan Africa of 4.4 billion, compared to 4.0 billion from UNPD. To re-align the projections created in DemProj to the UN Medium Variant, the difference between the two projections was subtracted (published UN medium variant and DemProj projection for medium variant) from the DemProj projections in each year. The same adjustment (in absolute terms) was made to the alternative population projections. For example, in 2100 the DemProj output for the 'address all unwanted fertility' projection was 3.2 billion; this value was adjusted to 2.8 billion to bring it in line with the published UN median projection. Both adjusted and unadjusted population projections are available.

V. Results

The graph below shows the resulting population projections for the scenarios described above.

The graph below shows the population projections for 2030 and 2100 for the scenarios. This graph illustrates the key point of this analysis. While the changes in TFR and the age-distribution of births happened in the short term (over the coming 5 years), the impact of these changes is not seen until the long term. The 2030 populations across all scenarios are nearly identical, however, by 2100 a very large differential exists across the four scenarios.

Comparing 2030 and 2100 Population By Scenario

[i] Available from: https://esa.un.org/unpd/wpp/

[ii] All values were taken from StatCompiler. The following surveys were used: Angola 2015-16 DHS, Benin 2011-12 DHS, Burkina Faso 2010 DHS, Burundi 2016-17 DHS, Cameroon 2011 DHS, Central African Republic 1994-95 DHS, Chad 2014-15 DHS, Comoros 2012 DHS, Congo 2011-12 DHS, Congo Democratic Republic 2013-14 DHS, Cote d'Ivoire 2011-12 DHS, Eritrea 2002 DHS, Ethiopia 2016 DHS, Gabon 2012 DHS, Gambia 2013 DHS, Ghana 2014 DHS, Guinea 2012 DHS, Kenya 2014 DHS, Lesotho 2014 DHS, Liberia 2013 DHS, Madagascar 2008-09 DHS, Malawi 2015-16 DHS, Mali 2012-13 DHS, Mauritania 2000-01 DHS, Mozambique 2011 DHS, Namibia 2013 DHS, Niger 2012 DHS, Nigeria 2013 DHS, Rwanda 2014-15 DHS, Sao Tome and Principe 2008-09 DHS, Senegal 2016 DHS, Sierra Leone 2013 DHS, South Africa 1998 DHS, Swaziland 2006-07 DHS, Tanzania 2015-16 DHS, Togo 2013-14 DHS, Uganda 2016 DHS, Zambia 2013-14 DHS, Zimbabwe 2015 DHS.

[iii] Bongaarts, "The Measurement of Wanted Fertility." Population and Development Review; Vol. 16, No. 3 (Sep., 1990), pp. 487-506.)

[iv] Stover J, Kirmeyer S. , DemProj: A Computer Program for Making Population Projections , 2008Washington, DCFutures Group International/Health Policy Initiative