

Impacts of COVID-19 on the 2020 state population forecast

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Summary

The public health crisis of COVID-19 has caused a unique social and economic crisis in our state, with the pandemic significantly impacting our population growth forecast for this year.

Because of the pandemic, population growth forecast in Washington is set back by five years. (The last year of the current forecast wouldn't occur until five years before the end of the last one). We forecast that this crisis limits fertility and migration, and presents obvious impacts to mortality.

We used relationships with the unemployment rate to forecast short-term reductions in fertility. We also lowered long-term fertility rates because of recent trends, which are the lowest since 1981. Both changes led to a drop in births across the forecast period.

We adjusted migration in the short term because of employment changes, and because the federal government enacted policies and restrictions that changed international migration.

We made downward estimates to life expectancy using COVID-19 death data and 2019 deaths. However, this only applied to 2021. We will return to previous forecast assumptions in 2022.

When we put these assumptions together, they reduced Washington's population forecast in 2040 by almost 400,000 people. A majority of that impact comes from short-term changes, and

how these changes build on themselves over time.

This forecast attempts to balance uncertainty with the need for forecast population values. This work would not have been possible without our colleagues at the Department of Health, Economic and Revenue Forecast Council and the Caseload Forecast Council.

Introduction

COVID-19 is a public health crisis that caused an economic downturn. This dual impact event is considerably different from an economic recession. We had to revise our state population forecast assumptions because of the outbreak, containment measures and resulting recession.

We included a timeline of events to help explain the assumptions we used in the forecast (see Appendix A for more detail). The state's population estimates and forecasts use an 'April year' instead of a traditional calendar year. This 'year' lasts from April 2 of the previous year to April 1 of the estimate or forecast year.

For example, the vital events (births and deaths) that we used to develop the 2020 estimate occurred between April 2, 2019 and April 1, 2020. This is important because the pandemic hit Washington earlier than most other states. The first reported death in the U.S. from COVID-19 was in Snohomish County on Jan. 21, 2020, (McNerthney 2020). And, the first largescale

mortality event was at a nursing home in Kirkland Feb. 29 (McNerthney 2020). The timing of these early events puts significant numbers of new cases and deaths in the 2020 *estimate* year rather than the first *forecast* year of 2021.

The state forecast uses a cohort-component model that accounts for population ages in each year as well as the major components of population change: migration, fertility, and mortality. We incorporated births using actual values for estimate years and projected total fertility rates (average births per woman aged 15 to 45) for forecast years. We used actual values in estimate years for deaths, and projected them using the life expectancy at birth for each sex in the forecasted years. We determined expected net migration from a variety of data sources and input into the state forecast model as a total number for each year. For the forecast years, these values are applied and moved forward in time with the age distribution. This produces estimates of the population and population change by component for each year in the forecast period.

The majority of the impacts of these changes are related to short-term impacts from our assumptions.

The following sections provide the rationale for how we modified our specific assumptions in the

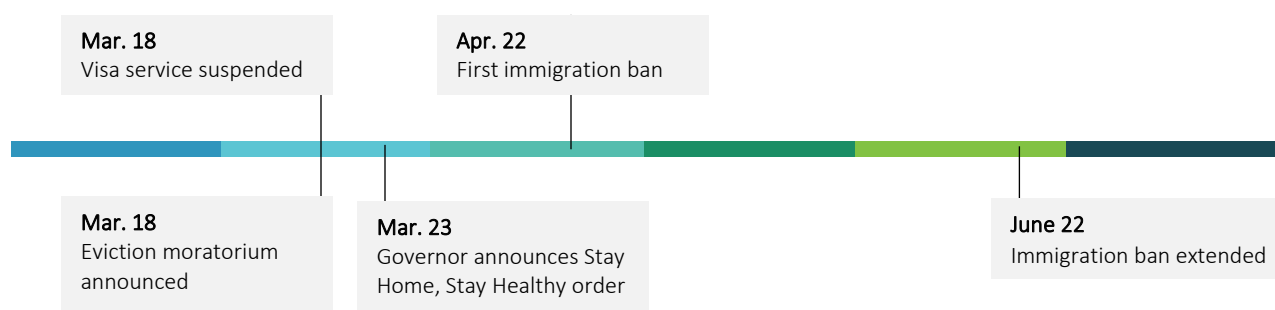
forecast, from immigration policy changes to COVID deaths and declining fertility. This paper will focus on important events leading up to the forecast in November, but will occasionally reference more recent events. Readers can find the full report for the [2020 State Population Forecast](#) online.

Migration

Net migration

Net migration, the difference between people moving into Washington and people moving out, is the most volatile and difficult to predict components of the forecast model. In a normal year, OFM uses an econometric model. This model predicts short-term net migration using specific employment sectors in Washington to California, Oregon, and comparing that to the rest of the U.S. (the model is used for five to seven years out). From there, net migration is transitioned to the average of net migration for the 30 years prior to the most recent federal census. COVID-19 made this approach unfeasible. This brought the need for us to further adjustments net migration to account for the pandemic response and recession. Figure 1 shows the timeline of events that led to our assumption changes.

Figure 1: Selected COVID-19 migration timeline



The primary methodology difference from previous years was explicitly breaking out international and domestic migration into separate components. Federal policy severely restricted immigration to the U.S. in response to the pandemic, which meant that an estimated 40% of Washington's net migration would be impacted. We estimated these migration types separately before adding them together to form the migration assumption.

Domestic migration

Domestic migration, or state-to-state migration, is the larger of the two migration components and can be more variable. This year is no different. Pandemic restrictions allowed mobility but also discouraged it. Policies such as rent relief and an eviction moratorium (enacted on March 18 before the Stay Home, Stay Health order on March 23 contributed to a lack of mobility (Governor Jay Inslee 2020a, Governor Jay Inslee 2020b)). While these events came before the launch of the state population forecast on April 1, they have important implications for the forecast.

The state deemed real estate and construction as essential work and they continued throughout the shutdowns. The National Change of Address data tabulated by the U.S. Census Bureau shows a 30% year-over-year increase in temporary address changes in March. This is because people moved before settling in for the quarantine (Rogers et al. 2020). Longer term, the impacts on migration are less clear because the housing market provided mixed signals: demand and prices remained high but we saw a lack of housing supply on the market (Northwest MLS 2020). Fewer homes on the market suggest that people were staying in place, but strong demand indicates there were still many movers. We can attribute some, but not all, of this impact to low mortgage rates and people moving within states (Speianu 2020).

The pandemic disrupted the state collecting full administrative data, such as school enrollment and out-of-state driver license surrenders, but the data remains helpful as we understand the level of mobility. School enrollment figures are down due to delayed kindergarten starts and home schooling. However, college programs such as Running Start are on target (CFC 2020). Out-of-state driver licenses surrendered to Washington were impacted by processing delays but show an average 33% decrease year over year in the months leading up to the forecast (Washington Department of Licensing 2020).

International migration

We used the international migration component to account for federal policy changes. Before specific immigration bans, travel bans were put in place as early as March 1 and expanded in scope through May 24. This made migration far more difficult to predict (Pierce and Bolter 2020). Routine visa service suspension in most countries (starting on March 18) made entering the country under normal conditions nearly impossible. This was perhaps more effective than later immigration bans (Pierce and Bolter 2020). Immigration bans from numerous countries that were put in place on April 22 were added to and extended on June 2. This, effectively prohibited immigration for the rest of 2020 (Pierce and Bolter 2020). Taken together, these changes effectively eliminated most paths of migration for at least three quarters of the 2021 April year. Some refugees were still resettled and migration via exceptions in the visa bans allowed limited migration (Office of Refugee and Immigrant Assistance 2020). Given these factors, OFM reduced international migration by 90% instead of 100%. This accounts for policy timing and data on Washington's refugee assignment levels.

At the time of the forecast, we didn't know the results of the 2020 presidential election. So, it

was not clear what type of federal policy environment would be in place for the first few years of the forecast. Given this uncertainty, we assumed that public health-based migration policies would likely persist until April year 2022 — when a vaccine would be widely available.

International and domestic migration exhibited great uncertainty in the short and long term. This caused a more cautious short term by using severely modified short-term assumptions. We transitioned the final decade of the forecast to the 30-year net migration average.

Fertility

Despite popular speculations of a “COVID baby boom”, this is unlikely because families faced economic uncertainty, as a Brookings report points out (Kearny and Levine 2020). Fertility — even though it is a more stable component of population change when we compare it to migration — can still be variable and difficult to predict.

We made two substantive changes to the fertility assumptions in this year’s forecast. The first addressed the short-term implications of the COVID-19 pandemic and recession. The second addressed long-term trends that have shifted fertility downwards in recent years. Although these two changes are very different, but both result in lower fertility. We expect the short-term impact to last for the next few years before transitioning into the updated long-term fertility trend. One of our key assumptions is that birth decisions lag by nine months. This means we won’t likely feel the COVID-19 impact to fertility until the final quarter of the 2021 April year.

Short-term fertility assumptions

Fertility is related to the performance of the economy, particularly to employment (Autor et al. 2019). The COVID-19 induced recession impacted employment greatly, ranging from furloughs to layoffs. In our forecast, these impacts are represented by the unemployment rate. This rate is highly related with fertility after we assume a one-year lag in the total fertility rate (births per woman aged 15-45) (Kearney and Levine 2020). Our forecast lowered the fertility rate after we used the unemployment rate and the correlation between the previous years’ (Kearny and Levine 2020). The authors found the following after they accounted for differences between states: That for every one percentage point increase in the unemployment rate, the TFR would decrease by 0.9% (Kearny and Levine 2020).

A model specifically for Washington showed a decrease of 0.4%. This number shows a weaker effect, but the model proved useful for making our fertility adjustments.

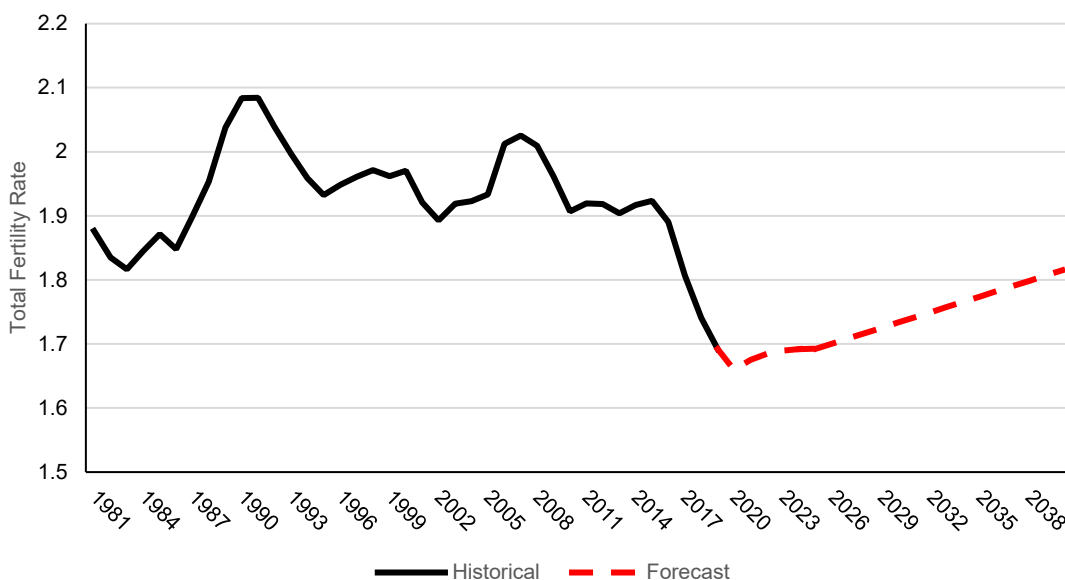
The Economic and Revenue Forecast Council makes quarterly economic forecasts for budgeting and revenue purposes. The September forecast provided an unemployment rate projection from 2021 to 2025 (Economic and Revenue Forecast Council 2020). When we applied it to the model, it estimates we will return to current fertility rates by 2025. The current TFR of 1.69 is the lowest since at least 1981, so the short-term forecast of lower fertility is historically low. However, this is consistent with decreasing births and rates since 2016. This trend in lower fertility required an adjustment to our long-term fertility targets.

Long-term fertility assumptions

In recent years, births and birth rates have fallen. Figure 2 shows that birth rates have steeply declined since 2016. This trend started with the Great Recession in 2008. Our long-term targets experienced only minor revisions the past few years as we’ve waited for the data to show a fully established trend. OFM is not alone in this approach since several diverse groups have noticed downward trends in births and rates (Martin et al. 2019, FTI Consulting 2020).

To take recent fertility changes into account, we used a regression model that relates the U.S. fertility rate to Washington from 1981 to 2019 (to model a 2040 TFR target of 1.815). OFM adjusted the long-term target to match the prediction of the model under the assumption that fertility will be lower. Historic lows are unlikely to be permanent and that rates will move towards the mean. Figure 2 shows that we’re entering an historically low period of fertility rates, but that we assume we’ll return to more reasonable rates.

Figure 2: Total fertility rate



Source: Office of Financial Management

Mortality

Mortality tends to be the most stable component of population change. Life expectancy tends to change slowly over time. Pandemics, wars, and other large mortality events can be exceptions. At the time of the forecast, COVID-19 deaths made up about 2.5% of estimated April year 2020 deaths, and an unknown percentage of the 2021 deaths because of the high number of deaths in March, before the April year began. Regardless of scale,

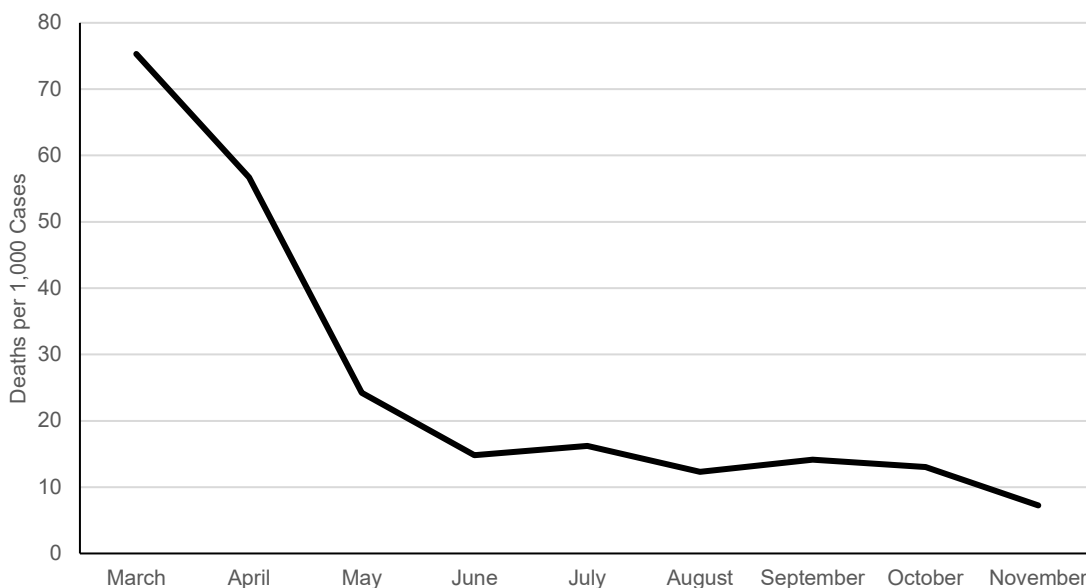
mortality has been a key focus of pandemic response and policy. This focus began in late January with the first U.S. death happening on Jan. 21 in Snohomish County. It continued through the first large mortality event at the Life Case Center of Kirkland starting around Feb.29 (McNerthney 2020). Since those early deaths, the mortality rate of the virus has fallen from about 70 deaths per 1,000 cases in March to 11 deaths per 1,000 cases in October. These numbers do not include possibly missed deaths

because of limited testing or comorbidity leading to different ‘cause of death’ attributions.

The strong decline in mortality rates, despite vastly higher cases, suggests that the mortality

impact may be less in scale than other large mortality events (e.g. World War II). Figure 3 shows that for COVID-19 in Washington, we can more lightly adjust the mortality assumptions due to the timing of deaths in the pandemic.

Figure 3: Washington 2020 COVID-19 deaths per thousand cases



Source: Washington Department of Health Weekly COVID-19 Case and Death Report

Trying to estimate a specific number of deaths during a pandemic is difficult since some responses (e.g., masks and driving less) may reduce deaths from other causes such as the flu or accidents. Instead, OFM opted to adjust life expectancy in 2021. With no COVID-19 influenced estimates to draw from, we created a life table from 2019 deaths and the male and female population. We also created a life table where we added all year-to-date COVID-19 deaths to 2019 deaths.

The difference in the two life tables would be the mortality impact if COVID-19 had struck in 2019 instead of 2020. Using this information, we adjusted life expectancy downward for males by 0.4 years (146 days) and downward for females by 0.35 years (128 days) — but only for 2021.

Additionally, to test if this approach was too simplistic in terms of impacts, we ran the same experiment using excess deaths. We calculated excess deaths by using the age specific median deaths from the previous five years and subtracting those from the age-specific deaths that we had in 2020. These results were similar to the COVID-19 death analysis, as were experiments that adjusted for only having a partial year of COVID-19 death data.

This experiment was made possible through a collaboration with the Department of Health and access to single year of age COVID-19 death data.

Conclusion

Taken together, these modifications to the state forecast assumptions have largely influenced Washington's population. The projected population in 2040 declined by just under 400,000 people compared to the 2019 forecast.

Changes to the short-term assumptions, such as the large drop in migration and the extended drop-in fertility rates combine to drive much of this loss. The drop in migration compounds the drop in fertility. Migration is highest among the 20 to 34-year-old age groups, the same group with the highest fertility rates. As such, the drop in migration alone would have led to lower births. Births dropped more since fertility rates were lowered at the same time. Mortality, while an important focus of policy makers, had a relatively small impact on the short-term forecast assumptions and was less entwined.

Long-term assumptions are even more uncertain but must still respond to COVID-19 and larger changes in trends. Given the increased amount of uncertainty, we transitioned from our traditional migration model to the 30-year average migration in 2030 almost immediately. This further decreased the overall amount of net migration that we expected. Drops in migration and fertility led to fewer births across the forecast period. Throughout the forecast, OFM assumed that the public health consequences of the pandemic will be limited to the short term, leading us to resume our previous mortality assumptions after 2021.

These changes attempt to acknowledge uncertainty in the current forecasting environment while still providing a reasonable forecast for planning and other forecasting purposes.

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Appendix A: Selected COVID-19 Timeline

Date	Event
01/21/2020	First U.S. case in Snohomish County.
02/16/2020	First U.S. death.
02/29/2020	First Washington death in Kirkland.
02/29/2020	First wave of school closures in King County.
03/01/2020	Travel bans from Europe.
03/06/2020	First Colleges and Universities stop in-person classes
03/13/2020	Statewide in-person school closures announced.
03/18/2020	Suspension of routine visa services in most countries.
03/18/2020	Eviction ban instated
03/22/2020	National Emergency Declaration.
03/23/2020	Stay Home, Stay Healthy quarantine announced in Washington.
03/27/2020	Coronavirus Aid, Relief, and Economic Security Act
04/02/2020	Stay Home, Stay Healthy extended
04/06/2020	School closures extended
04/15/2020	Proclamation for reduce prison population
04/22/2020	First federal immigration bans enacted
05/04/2020	Stay Safe, Stay Healthy county re-opening announced in phases based on epidemic spread
05/31/2020	Stay Safe, Stay Healthy extended
06/02/2020	Eviction ban extended to August 1
06/11/2020	K-12 phased re-opening
06/22/2020	Federal immigration ban extended
06/27/2020	Stay Safe, stay Healthy re-opening paused
07/07/2020	Stay Safe, Stay Healthy mask order
11/15/2020	Stay Safe, Stay Healthy rollback
12/10/2020	Stay Safe, Stay Healthy rollback extended
12/15/2020	First vaccines given in Washington