Part of the UPPP Series

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UTAH PRISON PROJECTIONS PROJECT: PROCESS & METHODOLOGY

Issue: This document outlines the process and statistical methodology used to forecast Utah's prison population. The framework is designed to be dynamic and adaptable, enabling the integration of new data and adjustment to evolving trends.

Overview

The Utah Prison Projection Project (UPPP) is a collaborative effort between the Utah Department of Corrections (UDC) and the Utah Commission on Criminal and Juvenile Justice (CCJJ). This document provides an overview of the process and statistical approach employed to forecast Utah's prison population. Future projection efforts will be designed to adapt to changes in policies and legislation, and to allow for deeper analysis of key sub-populations. The full UPPP project plan is available here.

Process & Data

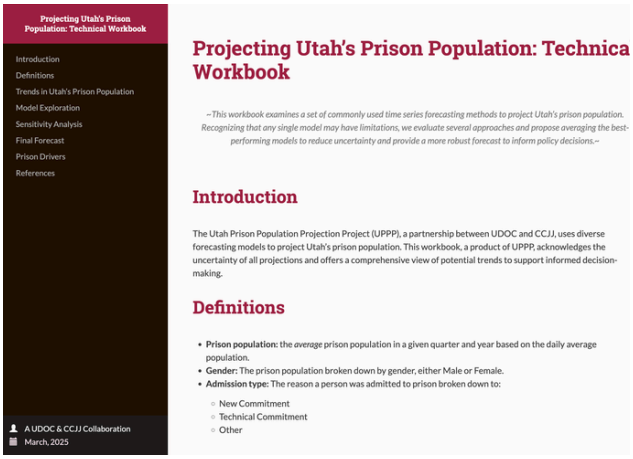
Utah developed its prison population forecasting framework through a comprehensive review of the national literature and consultations with local expertise and selected states to understand their successes and challenges in prison projection work. This review guided the exploration of commonly used forecasting methods to be analyzed on Utah data.

The analytical process began with a descriptive analysis to identify trends, seasonal variations, and irregular patterns using historical quarterly prison population data between 2010 and 2024.

The forecasting model presented in the **UPPP Dashboard** follows a two-step, hybrid approach: it combines a linear model with structural controls and a residual adjustment using exponential smoothing to account for unexplained variation. These structural controls were incorporated to address the sharp shifts in Utah's prison population following the Justice Reinvestment Initiative (JRI) in 2016 and the COVID-19 pandemic in 2020. Additionally, general population trends and violent crime rates were analyzed to assess their influence on future growth. The projection work is formalized in the *UPPP Technical Workbook* as visualized in Figure 1.

The UPPP methodology was selected through a review of the literature, local expertise and learning from other states.

Figure 1: *The UPPP Technical Workboook*



Training & Validation

Statistical models were trained on historical prison data using an 80/20 split for training and testing to evaluate predictive performance. The error rate, calculated as the difference between predicted and actual values divided by the total inmate population, tended to be lowest in short-term forecasts (within one year). Some models showed a tendency to underestimate/overestimate growth post-COVID-19.

The final forecast is derived by summing the individual gender-based forecasts and applying a systemic bias adjustment to correct for consistent under- or overestimation and guiding the model toward historical median tendencies.

Ongoing validation improves accuracy for effective policy decisions

Limitations & Updates

Current projections do not account for recent or emerging legislative and policy changes, which will be incorporated in future work. The Technical Workbook provides a framework for updating projections as new data emerges. Ongoing validation and refinement are crucial for projection accuracy and informed policy decisions. Future iterations may enhance forecasting precision with a simulation-based approach.

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