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### **Using forecasting for equitable, efficient, and effective food distribution policies at food banks**

Food Banks are non-profit hunger relief organizations that collect, store, and distribute donated and surplus food. They partner with local hunger relief organizations, such as soup kitchens and food pantries, to distribute food to people in need. Since the need for food often outstrips the supply, food banks aim to equitably distribute food throughout their network in an efficient manner, ensuring no food is wasted (effectiveness). However, achieving equitable, efficient, and effective distribution can be challenging since these organizations operate in an environment characterized by supply, demand, and resource uncertainty.

Food banks contend with supply-side uncertainty in the frequency, quantity, and type of donations they receive. To better match need (demand) with available food (supply), forecasting models that predict the amount of food received by type and quantity can prove helpful as food banks examine strategies for optimizing food distribution throughout their service area. In our work, we develop predictive models of donated supply for a local food bank affiliated with Feeding America. The food bank operates six branch warehouses that support nearly 800 partner agencies and programs in its 34-county service area. We evaluate the efficacy of various time series models in producing forecasts of monthly food donations by food type, donor, and receiving location. We use the predicted food donation quantities in an optimization model to determine equitable distribution policies and identify counties that may be under-served.