

# FPOP™

A decision support system to project the long-term value of today's intervention investments



Investments in improved maternal and childhood nutrition and sanitation pay increasing future dividends in population health because of intergenerational effects. Unfortunately, we don't always know which investment to make and how to target an intervention to optimize its value. Furthermore, we can't easily compare the potential long-term benefits of one intervention outcome to another. RTI International created FPOP to help decision-makers make better intervention decisions by analyzing the long-term benefits of possible interventions in the context of the entire life stage of individuals and their descendants.

## Overview

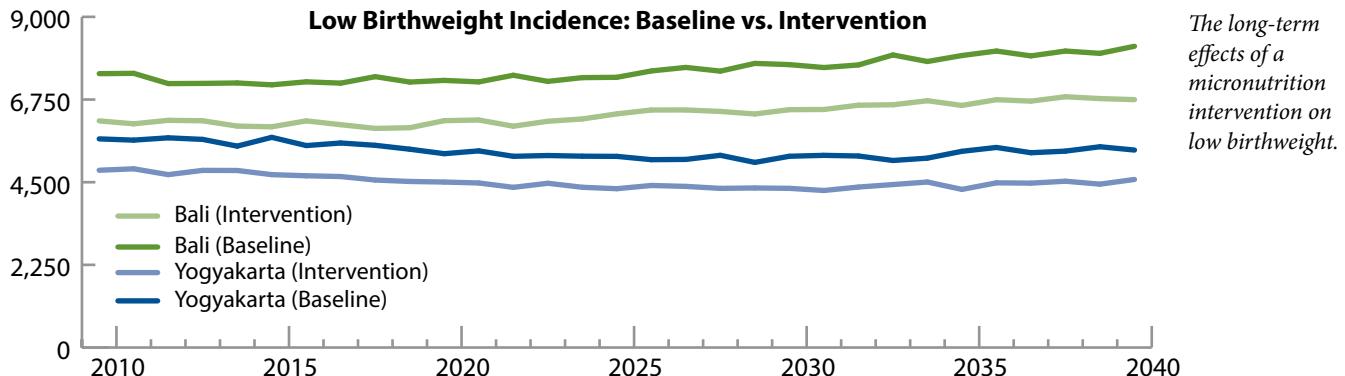
FPOP is a dynamic microsimulation model that makes geospatially explicit projections of a baseline population into the future. The size, structure, and characteristics of the future population are subject to the response of that population to external events (e.g., improving nutrition or sanitation, changing climate). FPOP simulates births, deaths, marriage/divorce, and migration for each person in a synthetic population. A synthetic population consists of realistic representations of each household and person in an entire country. RTI has created several baseline populations, including for the United States, Indonesia, India, and China.

FPOP evaluates the effect of interventions on health by linking its demographics model to external health models. It simulates the complex interaction of a dynamic population under the influence of changes in nutrition, sanitation, disease, or other factors. FPOP creates a natural science laboratory *in silico* so users can test different intervention scenarios and see the effects not just in the next year or two, but decades into the future.

## Why FPOP?

Investments in health interventions such as those that improve nutrition or sanitation are expensive. Since resources are limited, funding agencies and national governments need the best insight into the value of their investments before making decisions. FPOP simplifies the simulation of long-term human societal systems by providing both the underlying synthetic populations and the demographics simulation engine to demonstrate how the health of these populations will change under a variety of intervention scenarios.

FPOP simulates changes to the life events of each person in the population as a consequence of his or her environmental and aging processes. FPOP also simulates the intra- and intergenerational influences of parents on their children. As a result, the long-term effects of an intervention can be assessed based on how they affect individuals, the households they occupy, and the community they live in. By simulating these complex scenarios, FPOP provides information to make decisions about interventions in an objective manner.



*The long-term effects of a micronutrition intervention on low birthweight.*

## The FPOP Advantage

- Allows for “what if” scenarios—the user can test hypotheses and compare the success of different interventions
- Analyzes intergenerational effects by tracking each household and person over time—characteristics and behaviors of each household and person are dynamically updated
- Provides a mechanism for studying the complex interactions between individuals, households, and communities
- Offers scalable system architecture that can run entire countries
- Uses existing data sources and does not rely on new primary data collection before work can begin
- Links to external models so forecasting the dynamic interplay of health processes on demographic processes can be studied in tandem
- Includes easy-to-modify behavioral assumptions and demographic probabilities

## Relevance to Nutrition and Sanitation Investments

FPOP has been used to study the effects of interventions to improve maternal nutrition on the population of Indonesia. In this study, we analyzed the long-term benefits of a micronutrition supplement for pregnant women on birth outcomes over a 30-year timeframe. The simulation tracked infants through their first month of life (i.e., the first two life-cycle stunting stages (conception and neonatal) and projected

reductions in the number of low birthweight babies over time. Establishing the micronutrition intervention in two provinces were projected to decrease cumulative low birthweight births by over 53,000 over the next 30 years.

While it is important to provide developing infants with proper nutrition, it is also important to limit the effects of diarrhea, which offsets the value of nutrition by depleting body fluids and causing profound dehydration. Diarrheal diseases account for 1 in 9 child deaths worldwide, and diarrhea is the second leading cause of death among children under the age of 5. The past 20 years have shown that, in addition to rotavirus vaccination and breastfeeding, diarrhea prevention focused on safe water and improved hygiene and sanitation is not only possible, but cost effective. FPOP can analyze the long-term effects of various improvements in sanitation and clean water on the future health of a population.

## More Information

William Wheaton  
Director, Geospatial Science & Technology  
+1 919.541.6158  
[wdw@rti.org](mailto:wdw@rti.org)

Phil Cooley  
Senior Fellow, Computational Biology  
+1 919.541.6509  
[pcc@rti.org](mailto:pcc@rti.org)

RTI International  
3040 E. Cornwallis Road, PO Box 12194  
Research Triangle Park, NC 27709-2194 USA

RTI 9461 0615

RTI International is one of the world's leading research institutes, dedicated to improving the human condition by turning knowledge into practice. Our staff of more than 3,700 provides research and technical services to governments and businesses in more than 75 countries in the areas of health and pharmaceuticals, education and training, surveys and statistics, advanced technology, international development, economic and social policy, energy and the environment, and laboratory testing and chemical analysis. For more information, visit [www.rti.org](http://www.rti.org).

RTI International is a registered trademark and a trade name of Research Triangle Institute.

