



## RESEARCH BRIEF

# Investments in Family Planning and Education Drive Labor Productivity

**IN 2013 THE AFRICAN UNION (AU)** launched a 50-year development blueprint, **Agenda 2063**, which rallies AU member states around a vision to transform the continent into a global powerhouse.<sup>1</sup> Agenda 2063 specifically aims to achieve prosperity based on inclusive economic growth (focused on ending poverty and inequalities of income and opportunity) and sustainable development. To achieve this vision, member states will face multifaceted challenges to strengthen economic competitiveness and accelerate inclusive growth, including increasing economic productivity. Since the 2007-2009 global financial crisis, many countries around the world—including those in sub-Saharan Africa (SSA)—have experienced low or stagnant growth in productivity. According to the World Economic Forum's 2019 Global Competitiveness Report, weaknesses in the health and skills (human capital) of a country's population are a primary cause of anemic economic performance around the world, including in SSA.<sup>2</sup>

To achieve Agenda 2063, it is critical for member states to invest in the human capital of SSA's population today. A 2016 report, *Fostering Economic Growth, Equity, and Resilience in Sub-Saharan Africa: The Role of Family Planning*, explored the channels through which family planning contributes to economic growth.<sup>3</sup> The report highlighted the well-established connection between investment in voluntary family planning and human capital development. The report also suggested that greater investment in expanding access to family planning may improve economic competitiveness, arguing:

- Uptake of family planning contributes to fertility decline and corresponding shifts in the age structure of the population.
- This shift facilitates greater investment in the human capital of the future workforce.
- In turn, a healthier and better-educated workforce will have greater productivity, increasing countries' economic competitiveness.

Of the factors that contribute to stronger economic productivity, the relationship between fertility decline and improved productivity remains under-researched. In this research brief, we aim to better understand the relationship between use of family planning, fertility decline, human capital development, and labor productivity. We hypothesize that in economies with both a modern industrial sector and a traditional low-skill and subsistence sector, improvements in human capital set in motion by fertility decline would contribute to increases in labor productivity, particularly where higher returns to education exist (in other words, where economies better match education and job opportunities). Our findings show that under two scenarios, more rapid fertility decline may contribute to earlier increases in labor productivity compared to slower fertility decline. Moreover, among the five countries studied, those with higher rates of return to education—in other words, where available jobs reward higher levels of education—have the potential for even faster economic growth than those with lower returns to education, suggesting that investments in family planning and education are mutually reinforcing.

# Methodology

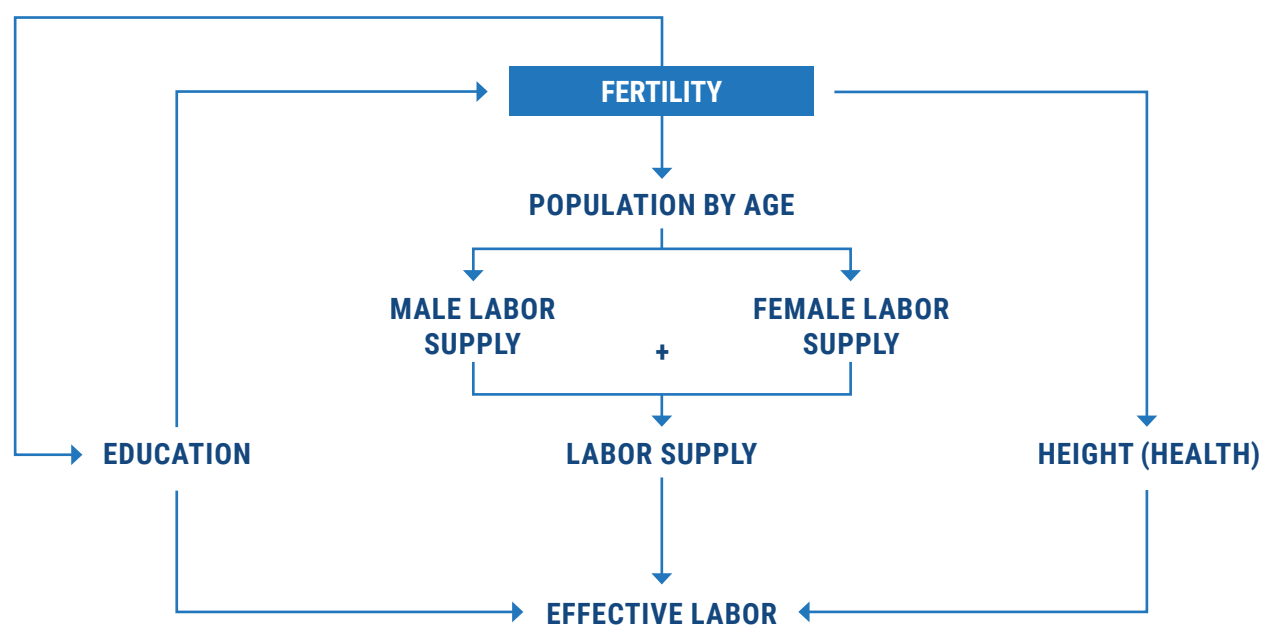
Fertility decline is associated with improvements in human capital through several mechanisms. When women and couples have access to voluntary family planning, they are able to choose the number, timing, and spacing of their births. Many couples will choose to have smaller families, allowing for greater investment in the health, nutrition, and education of each child. Women and couples are also better able to increase the amount of time between births, which significantly improves outcomes for child health and nutrition. These childhood benefits carry into healthier adulthood, contributing to improved workforce productivity by reducing disability and death, absenteeism, and low effectiveness due to poor health.<sup>4</sup> Increased uptake of family planning also reduces early childbearing, which is associated with poorer health and educational outcomes for both mothers and children.<sup>5</sup>

To assess the relationship between family planning, fertility decline, and labor productivity, we applied the Canning-Karra-Wilde (CKW) macrosimulation model in five countries in SSA: Ghana, Kenya, Nigeria, Uganda, and

Zambia. The CKW model elaborates the channels through which fertility decline affects the effective labor supply (see Figure 1) and economic growth. The CKW model, explained in detail in Box 1 (page 8), estimates the total output and the size of the labor force under a baseline high fertility scenario compared to a low fertility scenario. This model allows us to estimate output per worker under different fertility scenarios and to examine the relationship between fertility decline and labor productivity.<sup>6</sup> The model accounts for the channels from fertility decline to human capital improvements described above, including a feedback loop for the relationship between fertility decline and improved education whereby better-educated women in turn have smaller families.

To conduct the analysis described in this brief, we updated country-specific data in the model. We also updated starting values of each country’s macroeconomic and demographic inputs. Specifically, we applied recent country data on returns to education (where available) and age- and gender-specific labor force participation rates and heights for the five countries.<sup>7</sup>

**FIGURE 1**  
**FERTILITY DECLINE INFLUENCES EFFECTIVE LABOR SUPPLY THROUGH MULTIPLE CHANNELS, PARTICULARLY EDUCATION AND HEALTH, IN THE CKW MODEL**



**Source:** Mahesh Karra, David Canning, and Joshua Wilde, “The Effect of Fertility Decline on Economic Growth in Africa: A Macrosimulation Model,” *Population and Development Review* 43, no. S1 (2017): 237-63.



## Results

Baseline data are summarized in Table 1 (next page). In all five countries, more than one-third of the labor force (and in Kenya, Uganda, and Zambia, more than one-half) work in agriculture; yet with the exception of Nigeria, agriculture comprises a comparatively modest proportion of GDP, under 30 percent.<sup>8</sup> Agricultural output per worker in these countries is generally lower than industrial output because a substantial proportion of agricultural production is not mechanized. By comparison, in modern industrialized sectors of the economy, the average level of education in the labor force becomes more salient.

In a previous application of the CKW model, Karra et al. found that age structure change brought about by rapid fertility decline is associated with higher economic growth. However, the human capital effect of lower fertility creates even greater and more enduring economic growth by generating improvements in labor productivity.

The authors found that while the effect is not seen for several decades, the biggest overall contributor to productivity and economic growth is the feedback loop between fertility decline and education. This effect lags because as fertility declines, a population may continue to grow for several decades because of past high fertility. As the total fertility of each cohort of parents declines, increased investment in the “quality” (health and education) of their children becomes possible, thereby improving the human capital of each new cohort. These smaller, healthier, and better-educated cohorts take time to reach working age. As a result, it takes 15 or more years for improvements in human capital resulting from fertility decline to be reflected in the average education of the labor force. Thus, we expect that countries with faster fertility decline will see the earliest and largest increases in labor productivity, particularly where the interaction of fertility and education is maximized through greater returns to education.



TABLE 1

## COUNTRY DATA APPLIED IN MODEL

	Total Fertility Rate	GDP Per Capita	Agriculture	Returns to Education	Total Economy Output per Worker in 2015
	INITIAL VALUE	PPP, USD 2011	% LABOR	%	PPP, USD 2011
Ghana	4.18	\$3,396	41.5	4.2	\$8,944
Kenya	4.06	\$2,584	61.1	n/a	\$6,405
Nigeria	5.74	\$5,374	48.6	5.6	\$20,703
Uganda	5.78	\$1,803	73.8	11.9	\$5,790
Zambia	5.20	\$3,636	61.8	n/a	\$9,824

**Notes:** Rates of return to education in each country depend on the match between education level in the labor force and the available job opportunities. “n/a” indicates that recent estimates of returns to education not available. For Kenya, Uganda’s estimate (11.9%) was used and for Zambia, Malawi’s estimate (12.1%) was used.

**Sources:** United Nations (UN) Department of Economic and Social Affairs, *World Population Prospects, 2019 Revision* (New York: UN, 2019); World Bank, “GDP per Capita,” <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>; International Labour Organization (ILO), ILOSTAT, <https://ilostat ilo.org/data/>; and Evan D. Peet, Günther Fink, and Wafaie Fawzi, “Returns to Education in Developing Countries: Evidence From the Living Standards and Measurement Study Surveys,” *Economics of Education Review* 49 (2015): 69-90.

TABLE 2

## RESULTS OF CKW MACROSIMULATION BY COUNTRY

	2015 (Baseline)	2060		2080		2100	
		HIGH FERTILITY	LOW FERTILITY	HIGH FERTILITY	LOW FERTILITY	HIGH FERTILITY	LOW FERTILITY
Ghana	\$8,510	\$7,019	\$7,413	\$6,684	\$7,542	\$6,502	\$7,966
Kenya	\$11,560	\$9,842	\$11,159	\$9,865	\$13,310	\$10,234	\$16,532
Nigeria	\$27,577	\$22,597	\$24,258	\$22,242	\$26,359	\$22,974	\$30,623
Uganda	\$14,129	\$12,106	\$13,876	\$13,095	\$18,078	\$15,042	\$23,737
Zambia	\$19,527	\$14,968	\$16,216	\$14,072	\$17,158	\$13,593	\$19,731

**Source:** PRB analysis of data.

Results of the CKW macrosimulation for the five countries are consistent with this expectation (see Table 2). In all five countries, aggregate labor productivity initially declines from the baseline because physical capital is growing slower than the growth of the labor force. In a scenario with faster fertility decline (“Low Fertility”), the recovery and improvements in labor productivity are larger and occur earlier compared to a scenario of slower fertility decline (“High Fertility”).

Comparison of results across the five countries also confirm that the largest increases in labor productivity

occur in countries with higher returns to education. In countries with lower rates of return to education and slower fertility decline, the human capital increases are smaller and therefore take longer to offset the fall in income due to the falling levels of physical capital per worker. Ghana, with the lowest rate of return to education of the countries analyzed, does not reach its initial labor productivity levels, even by the end of the century. In Nigeria, with relatively low returns to education, the turnaround in output per worker from the baseline is modest, even in the low fertility scenario (see Figure 2, next page).

The three countries with the largest estimated returns to education—Uganda, Kenya, and Zambia—experience faster and larger improvements in labor productivity. In Uganda, where fertility starts at about the same level as Nigeria but returns to education are higher, the increase in labor productivity occurs around 10 years earlier and rebounds to exceed labor productivity observed at baseline by over 65 percent (see Figure 3).

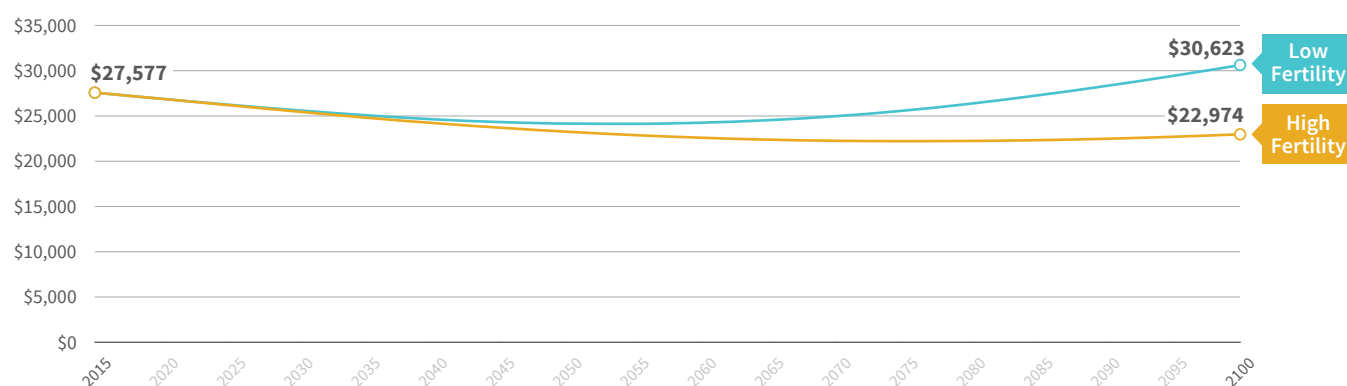
These results suggest that the turnaround in labor productivity set in motion by fertility decline may be enhanced by investments in education that build skills and match opportunities in the job market. With greater returns to education and greater concentration of workers in the modern sector, countries will experience even higher labor productivity. Given the relationships and indicators assumed in this model, some high-fertility countries may not see output per worker rebound over the remainder of this century unless fertility declines more rapidly, as in the low fertility scenario.

This finding underscores the urgency of strengthening multisectoral development programs—especially voluntary family planning and education—if Agenda 2063 is to be achieved.

Positive disruptions that strengthen the feedback loop between education and fertility—such as increased uptake of family planning early in marriage or rapid increases in upper secondary and tertiary education for girls—could accelerate the timeline and size of the labor productivity effect. Disruptions that increase returns to education, as rapid industrialization did in the East Asian Tigers in the 1960s-1990s, would also be expected to significantly accelerate and increase the labor productivity effect. Such potential disruptions are already emerging in countries across SSA, where leap-frog technologies such as mobile money platforms and drone delivery services are rapidly creating demand for engineering education and workforce development to further advance technological innovation.<sup>9</sup>

**FIGURE 2**

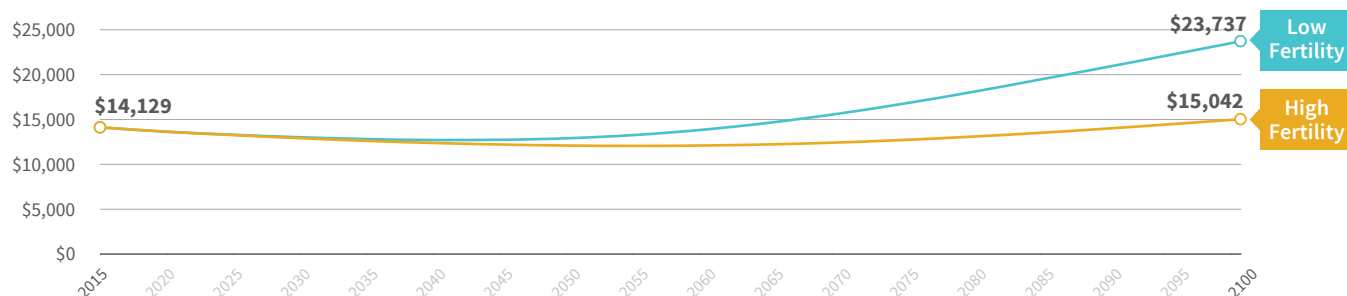
### OUTPUT PER MODERN SECTOR WORKER: NIGERIA



Source: PRB analysis of data.

**FIGURE 3**

### OUTPUT PER MODERN SECTOR WORKER: UGANDA



Source: PRB analysis of data.



## Investment to Expand Access to Family Planning and Skills Development Is Urgently Needed

These results underscore the importance and value of mutually reinforcing social sector investments in human capital to accelerate gains in labor productivity in Africa. However, the findings also highlight that improvements in economic growth and labor productivity are neither automatic nor guaranteed. Efforts focused at improving overall health and educational attainment will have a smaller effect if fertility remains high. High fertility rates inhibit improvements in labor productivity by both maintaining or increasing the number of workers available at low wages and by depressing gains in health and education. Likewise, while fertility decline creates an enabling demographic environment as changes in the working-age population create the potential for a larger labor force, increases in labor productivity may not be attained if corresponding investments in human capital development, particularly education, are not made as the population age structure changes. These findings are consistent with the literature indicating that human capital investments can amplify and extend increases in income per capita set in motion by fertility decline. In a seminal study of fertility and economic growth in a panel of countries around the world, where investments in human capital were made while fertility declined, GNP per capita eventually stabilized at around 40 percent above its pre-fertility transition level.<sup>10</sup>

Further analysis of the relationship between investment in voluntary family planning, fertility decline, and labor productivity within countries and regionally is warranted. Key areas for further exploration include:

- This analysis was only applied in a small sample of five countries. This sample does not capture the range of demographic, economic, sociocultural, and policy diversity in high-fertility countries. Further application of the CKW model in other countries will increase our understanding of the relationship between fertility decline, human capital development, and labor productivity in different contexts.
- In the broader literature on the demographic dividend, the number of countries that achieved a demographic dividend is smaller than the number of countries whose population age structure changed following fertility decline. Some studies suggest that failure to invest in human capital development may contribute to tepid economic outcomes in countries that have achieved favorable age structures. Further analysis to understand the interplay between demographic change, increases in GDP, and labor productivity will increase our understanding of how countries can maximize the dividend.





If the goals of Agenda 2063 are to be met, countries must urgently invest in actions that disrupt current stagnant trends in labor productivity. Multisectoral investments and approaches will be critical. Actions by ministries of Finance and Planning, Health, and Education that can improve labor productivity in countries include:

### **Increase domestic resource mobilization for family planning.**

The financial and policy environment for voluntary family planning programs across SSA has grown more promising in recent years. Some countries have sustained steady gains in use of modern contraception for over a decade, including Kenya and Malawi, where prevalence now surpasses 50 percent among married women. Many governments have made political commitments and increased domestic funding allocated for family planning programs. However, need and demand for family planning among women who wish to delay or avoid pregnancy in SSA still outstrips resources and program capacity. Domestic government sources covered only one-third of total expenditures on family planning in 2017, with international donors responsible for nearly half of costs and clients directly paying one-fifth.<sup>11</sup> Increases in this important metric will strengthen the impact and sustainability of family planning programs.

### **Amplify the fertility-education feedback loop by investing in strategies that help girls stay in school.**

Ministries of Education should be supported to invest in evidence-based, context-specific approaches to help girls stay in school, including addressing economic barriers and sociocultural attitudes around early marriage. These approaches include increasing vocational education opportunities that equip the labor force with training and skills that match the labor market.

### **Create an enabling environment for school-work transitions.**

Healthy and educated youth must have opportunities to transition into the modern workforce. Education that increases employability or entrepreneurial skills can make a difference in the rate at which labor productivity increases. Improved human capital alone, however, cannot drive economic growth. More opportunities occur when skills match available jobs or entrepreneurial opportunities. One experimental study in Tanzania found that business training for girls at the end of secondary school encouraged their participation in income-generating activities and, consequently, they achieved higher incomes up to a year after leaving school.<sup>12</sup> Approaches with demonstrated success in other regions, such as blended training and internship programs that increased formal wage employment and income among low-income youth in Latin America, are being piloted in Africa.<sup>13</sup>



## CARRA-KANNING-WILDE (CKW) MODEL

Published in 2017, the Carra-Kanning-Wilde (CKW) model applies two fertility scenarios to assess the relationship between fertility decline and income per capita using the 2010 United Nations *World Population Prospects* high variant and low variant fertility scenarios.<sup>1</sup>

In the low variant projection, the total fertility rate of each country falls by 0.5 births per woman after five years, 0.8 births per woman after 10 years, and one birth per woman after 15 years. This reduction in total fertility is similar to that achieved in the Matlab, Bangladesh intensive community-based rural family planning and maternal child health program. The Matlab program was designed to allow rigorous documentation of the demographic impact of a significant investment in community health workers and free access to modern contraceptives.<sup>2</sup>

The CKW model assumes three economic sectors: the modern sector (encompassing manufacturing, skilled labor, and the formal service sector), the traditional sector (encompassing subsistence agriculture and low-skill services), and a raw materials sector (which relies solely on foreign labor and has constant output over time). As our analysis is focused on human capital development, which is assumed to affect labor productivity in the modern sector and not in the traditional sector, we only present results for the modern sector in this policy brief.<sup>3</sup> The CKW model explores several potential mechanisms by which fertility decline affects economic growth, including a feedback loop between fertility decline and increases in female education.<sup>4</sup> To implement this feedback loop, better health and education of each cohort of women of reproductive age (which remains fixed at their age 20 level) increases the health and education of the subsequent cohort at age 20. Thus, the human capital of each cohort has a ripple effect on the human capital of the labor force over time.

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