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## Lower-Income Countries and the Demographic Dividend

Over the past 60 years, population age structures have been changing everywhere in the world. As the share of national populations at working ages has grown relative to the share of dependent children, many of the world's fastest-growing economies have enjoyed a substantial demographic dividend that has helped accelerate economic growth. Lower-income countries are at the early stages of this demographic transition. Important work lies ahead if they are to take full advantage of a changing age structure to accelerate economic growth.

The timing and magnitude of each country's demographic dividend depend on demographic and economic factors and the policies that influence them. This issue of the *NTA Bulletin* explores whether lower-income countries can experience a first demographic dividend—a significant boost to their economic growth as the share of the population in the working ages increases. Equally important is whether the resources freed up by the first dividend can support investment in human and physical capital that leads to a second dividend.

Changes in age structure are an inevitable consequence of the demographic transition, which can be divided into three broad phases. The first phase begins with high fertility balanced by high mortality, but then mortality—particularly infant and child mortality—starts to go down. Population growth accelerates and, as a result of better child survival, the share of children in the population increases, in some cases dramatically. Many countries have responded by initiating or expanding voluntary programs to reduce fertility.

During the second phase, fertility declines sufficiently to outweigh the effects of higher child survival. The number of children needing support goes down relative to the number of workers and taxpayers. At the same time, the number of elderly people remains small. With relatively few children and few old people, the proportion of the population in working ages reaches an all-time high.

There are two main policy challenges at this point. One is to expand employment opportunities to match the large number of workers. The second is to promote long-term economic growth by saving and investing a part of the resources that are no longer required to support large numbers of children.

During the third phase of the demographic transition, fewer young people, born in a period of low fertility, grow up and enter the labor force. At the same time, large groups of workers, born further in the past when fertility was high, reach retirement age. As a result, the share of the working-age population goes down, and the elderly portion of the population goes up. Improvements in life expectancy reinforce the effects of low fertility to produce populations that are much more concentrated at older ages.

This stage of population aging can act as a brake on economic growth because the number of consumers is growing more quickly than the number of workers. Alternatively, if resources generated by the first demographic dividend are invested in physical capital and in children's health and education and if workers save and invest to provide for their own retirement costs rather than drawing on the resources of younger generations, then population aging may generate a second demographic

dividend. That is, the processes of fertility decline and population aging can promote economic growth by raising the amount of physical and human capital per worker.

The changing pattern of consumption in relation to labor income in Vietnam illustrates all three stages of the demographic transition (Figure 1 left). The population of young consumers grew rapidly during the 1950s and 1960s, peaked in the late 1970s, and then began going down with declining fertility. Today, Vietnam is in a very favorable position for economic growth, with relatively few consumers for each worker.

Over the next 40 years, the population of child consumers is projected to remain quite small, but the number of elderly consumers will expand. As a result, beginning in 2019, Vietnam's position will become less favorable. Current estimates indicate that in 2050 Vietnam will have the equivalent of more than two consumers for each worker in the population.

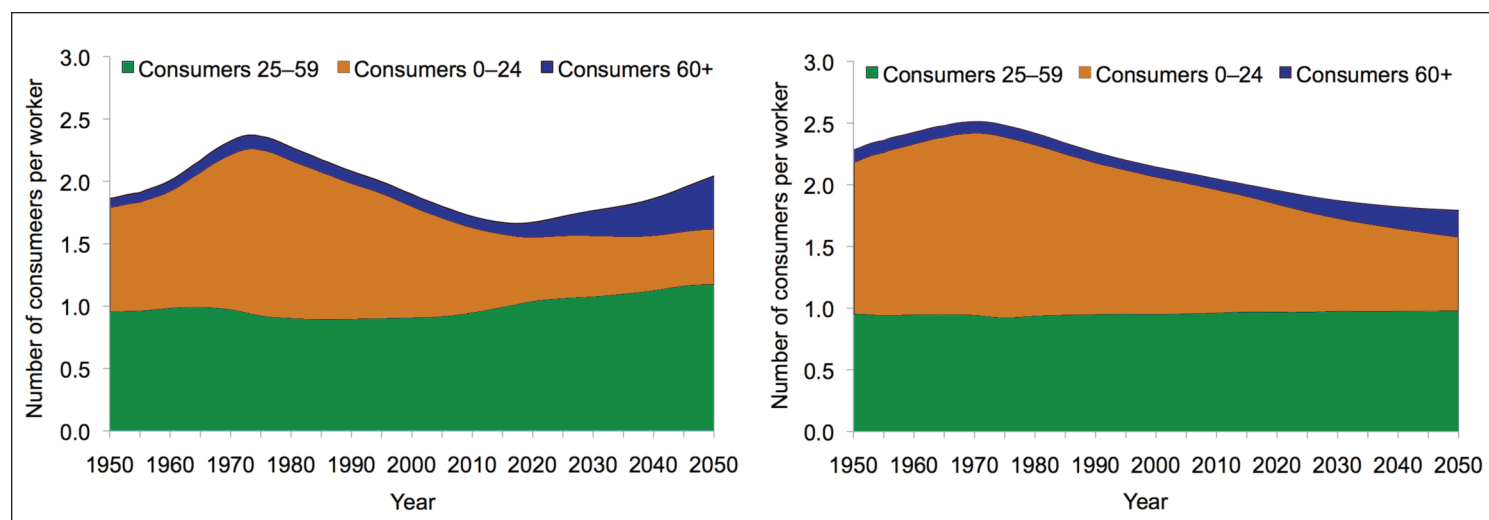
The Philippines is experiencing a slower demographic transition (Figure 1 right). As in Vietnam, the population of young consumers peaked in the early 1970s, but at a much higher level. And it is going down much more slowly, given the Philippines' continued high fertility. The number of elderly, as a proportion of the whole population, is growing, but very

slowly. As a result, by 2050, the Philippines will be in a somewhat more favorable demographic situation than Vietnam, but without having had important opportunities to save and invest that Vietnam will enjoy in the intervening years.

## The economic lifecycle

Changes in population age structure are important because people earn income and consume at very different levels over the course of their lives. Working-age adults, as a group, produce more through their labor than they consume, while children and the elderly consume more than they produce. Within this broad pattern, the economic lifecycle varies according to the structure of the economy, the level of development, public policy, and many other factors. Understanding the economic lifecycle is essential because its basic features, in combination with population age structure, determine the strength of the demographic dividend.

The level of economic development influences the economic life cycle in important ways. This can be seen in Figure 2, which shows per capita labor income by age for 34 NTA member countries in three income groups based on World Bank classifications—lower (low and lower middle), upper middle, and high. The countries in each income group are listed in Table 1.



**Figure 1. Changes in the number of consumers (children, working-age adults, and the elderly) per worker, 1950–2050, Vietnam (left) and the Philippines (right).**

Source: Calculated from NTA data; population estimates and projections from United Nations 2012.

Note: Consumers and workers are measured as effective consumers and effective workers by weighting the population at each age to reflect country-specific age differences in per capita consumption and labor income. See discussion of Table 1 for a more detailed explanation.

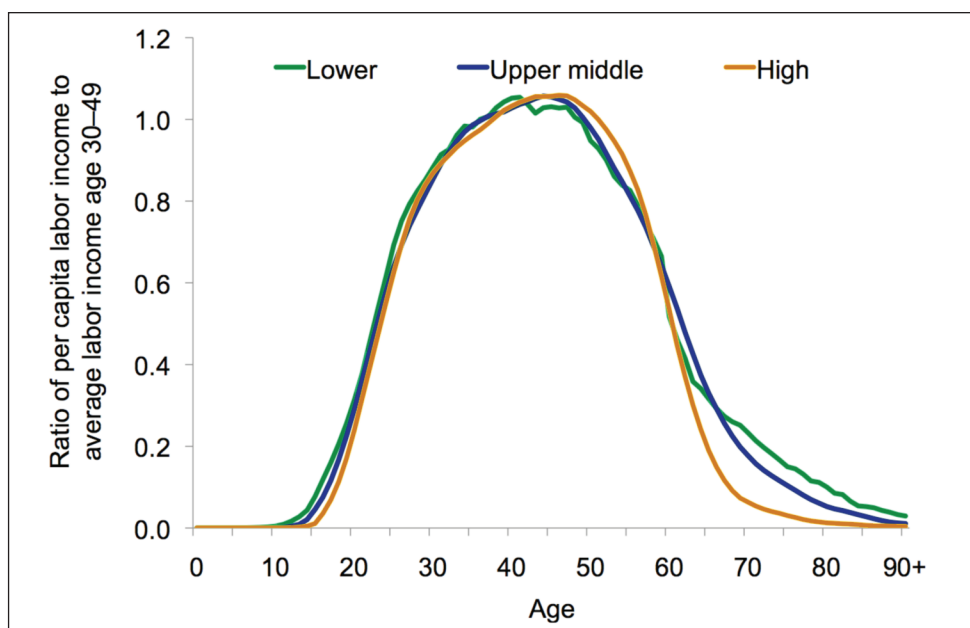
To facilitate international comparisons, labor income at each age is expressed relative to the average labor income of individuals in the country during their prime earning years, at age 30–49. Then a simple average is computed of the ratios at each age across countries in each income group.

The patterns are broadly similar for countries at all income levels, with labor income rising steeply for those in their 20s, reaching a peak around age 40 and declining thereafter. The largest differences occur at older ages. In high-income countries, labor income is more concentrated within the middle years of the life span. Labor income begins to rise later in life, peaks at a somewhat later age, and then declines very sharply in the 60s as many workers retire.

In lower-income and upper-middle-income countries, workers begin to generate labor income earlier in their lives and are likely to continue working into old age. Older workers tend to earn much less than prime-age adults, however, and as a result, labor income declines steadily at older ages. One factor affecting the age pattern of labor income is the differing levels of education among age groups. In countries where educational opportunities have expanded rapidly in recent years, younger workers tend to have much more education than older workers and thus are likely to earn more.

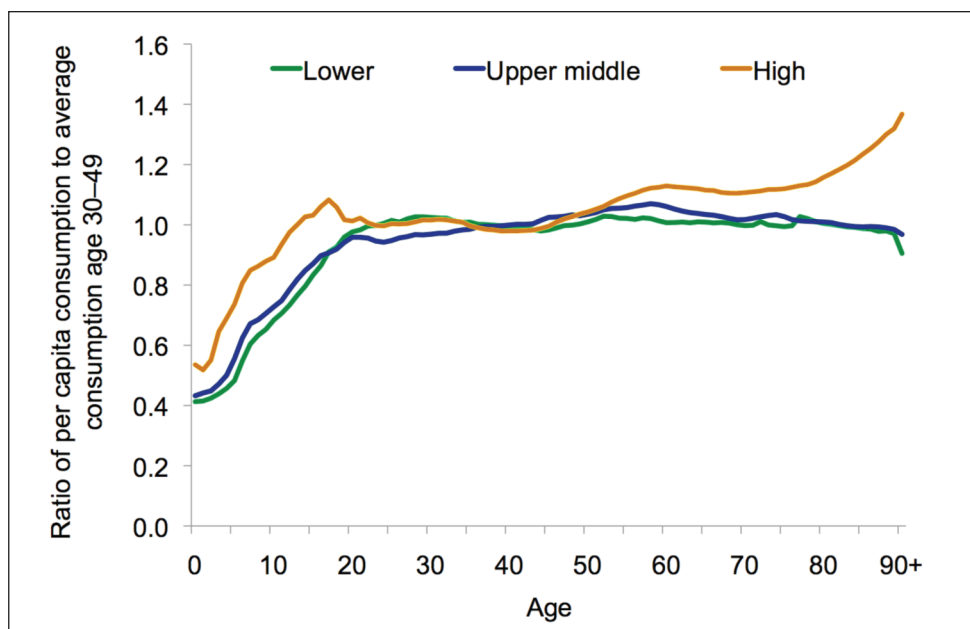
Consumption patterns also vary substantially with the level of economic development. Following a procedure similar to that followed for labor income, average consumption for individuals in each one-year age group is expressed relative to average consumption of those age 30–49 (Figure 3). As for labor income, the values for groups of countries are simple averages of the values for each country in the group.

The pattern in rich countries is quite distinctive, with consumption particularly high at both young and old ages. This largely reflects the consumption of education by children and young adults and the consumption of healthcare and long-term care by the elderly. Consumption by children is also somewhat higher in upper-middle-income countries than in lower-income



**Figure 2. Per capita labor income by age for 34 lower-, upper-middle-, and high-income countries.**

Source: NTA data.



**Figure 3. Per capita consumption by age for 34 lower-, upper-middle-, and high-income countries.**

Source: NTA data.

countries, while consumption by the elderly is about the same.

Labor-income profiles can be used to construct a refined measure of the workforce that incorporates age differences in labor force participation, unemployment, hours worked, and wages. One effective worker is defined as a person earning the average labor income of a person in the prime working-age group, at age 30–49. Those at each age are counted based on

their labor income relative to the prime working-age group.

For example, people age 50 might, on average, earn more than people in the prime working-age group, in which case each of them would count as more than one effective worker. A young adult age 20 and an elderly person age 70 are both likely to earn considerably less than a person age 30–49, so each would count as less than one effective worker.

**Table 1. Demographic and economic indicators for 34 NTA economies, 2010.**

Country	Total population (thousands)	Total fertility rate (TFR) 2005–2010	Gross national income (GNI) per capita (PPP international dollars)	Effective workers (% of population)	Effective consumers (% of population)	Support ratio	Annual change in support ratio, 2005–2010 (%)
<b>Lower income (low and lower-middle)</b>				<b>45.3</b>	<b>83.8</b>	<b>0.54</b>	<b>0.60</b>
Cambodia (KH)	14,137	2.8	2,080	57.5	83.6	0.69	0.90
India (IN)	1,224,614	2.7	3,330	47.3	85.3	0.55	0.54
Indonesia (ID)	239,871	2.2	4,180	51.0	88.1	0.58	0.68
Kenya (KE)	40,513	4.8	1,640	32.5	82.1	0.40	0.75
Nigeria (NG)	158,423	5.6	2,160	30.9	74.9	0.41	0.24
Philippines (PH)	93,261	3.3	3,950	43.2	88.5	0.49	0.46
Senegal (SN)	12,434	5.0	1,910	46.5	76.6	0.61	0.33
Vietnam (VN)	87,847	1.9	3,050	53.2	91.4	0.58	0.81
<b>Upper-middle income</b>				<b>49.3</b>	<b>89.7</b>	<b>0.55</b>	<b>0.40</b>
Argentina	40,412	2.3	15,470	48.4	92.2	0.53	0.42
Brazil	194,946	1.9	10,980	50.3	88.0	0.57	0.44
Chile	17,114	1.9	15,040	51.5	91.2	0.57	0.27
China	1,341,335	1.6	7,520	53.0	99.3	0.53	0.42
Colombia	46,295	2.5	9,000	48.3	88.8	0.54	0.36
Costa Rica	4,659	1.9	11,260	51.4	91.6	0.56	0.59
Jamaica	2,741	2.4	7,430 <sup>a</sup>	49.0	87.0	0.56	0.25
Mexico	113,423	2.4	14,350	48.0	85.3	0.56	0.41
Peru	29,077	2.6	8,790	47.7	88.7	0.54	0.44
South Africa	50,133	2.6	10,310	41.4	75.8	0.55	0.39
Thailand	69,122	1.6	8,130	53.9	93.2	0.58	0.13
Uruguay	3,369	2.1	13,540	48.7	95.1	0.51	0.26
<b>High income</b>				<b>52.0</b>	<b>102.1</b>	<b>0.51</b>	<b>-0.20</b>
Austria	8,394	1.4	40,310	53.0	100.6	0.53	-0.03
Finland	5,365	1.8	36,570	49.3	100.0	0.49	-0.82
France	62,787	2.0	34,920	47.7	100.8	0.47	-0.53
Germany	82,302	1.4	38,410	51.1	104.3	0.50	-0.22
Hungary	9,984	1.3	19,720	51.8	100.3	0.52	0.01
Italy	60,551	1.4	31,960	53.2	99.9	0.53	-0.12
Japan	126,536	1.3	34,810	52.9	113.0	0.47	-0.81
Slovenia	2,030	1.4	26,510	47.5	105.0	0.45	-0.34
South Korea	48,184	1.3	28,870	56.0	100.0	0.60	-0.18
Spain	46,077	1.4	31,170	52.8	97.9	0.54	0.24
Sweden	9,380	1.9	40,070	52.4	111.4	0.47	-0.19
Taiwan	23,162	0.9	20,200 <sup>b</sup>	54.9	98.6	0.56	0.26
United Kingdom	62,036	1.8	35,620	51.4	98.1	0.52	-0.11
United States	310,384	2.1	47,210	53.6	99.9	0.54	-0.33

Sources: Effective workers, effective consumers, support ratios, and annual change in support ratios calculated from NTA data. Population and total fertility rate for 33 countries, United Nations 2012; for Taiwan, Council of Economic Planning and Development 2012. Gross national income for 33 countries, World Bank 2013<sup>a</sup>, for Taiwan, World Bank 2013<sup>b</sup>.

Note: The values for effective number of workers and effective number of consumers are based on population estimates for 2010 and lifecycle estimates for a recent year that varies among countries.

<sup>a</sup> Accessed 27 November 2012.

<sup>b</sup> For 2012.

The effective number of consumers in each country is calculated similarly by weighting the population by the average consumption at each age. On average, those 30–49 years old are counted as one consumer, and all others are measured relative to that base group.

The support ratio is the effective number of workers divided by the effective number of consumers. A support ratio of 0.5, for example, means that each worker is, on average, supporting himself or herself plus one other consumer. If the support ratio increases, each effective worker is supporting fewer effective consumers. This frees up resources that can be used to raise per capita consumption or saving and investment or some combination of the two.

Table 1 shows the effective number of workers and the effective number of consumers in 34 NTA member countries, expressed as percentages of total populations. As background, the first three columns give the total population, total fertility rate (average number of births per woman), and per capita gross national income (GNI) for each country.

In most countries, the effective number of workers in 2010 was about half of the population. The value was highest in high-income countries, averaging 52 percent, and lowest in the lower-income countries, at 45 percent. High-income countries had an advantageous age structure because their populations were concentrated at peak earning ages.

The differences between individual countries can be very large. In South Korea, the effective number of workers was 56 percent of the population, while in Kenya and Nigeria, the effective number of workers was less than one-third. This is partly because these two African countries had so many children and partly because labor income for young adults in these countries was very low.

The apparent advantage of high-income countries disappears when we consider the effective number of consumers. This is because high-income countries tend to have large elderly populations, and the elderly in

these countries tend to consume more than other age groups. In lower-income countries, dependent populations are concentrated at young ages, and they tend to consume less than prime-age adults.

In most high-income countries, the effective number of consumers in 2010 was about equal to the population. In Sweden and Japan, however, the effective number of consumers was much larger. This is because their populations were relatively old, and elderly Swedes and Japanese consumed at very high levels. By contrast, in lower-income countries as a whole, the effective number of consumers was only 84 percent of the population. In Nigeria it was only 75 percent.

To understand the economic impact of age structure, it is essential to consider how both labor income and consumption vary over the life cycle. As shown in Table 1, high-income countries had the highest proportion of effective workers in their populations, but they also had the highest proportion of effective consumers. Lower-income countries had the lowest proportion of effective workers, but also the lowest proportion of effective consumers. As a result, support ratios in the lower-income countries were, on average, higher than in the high-income countries. Support ratios in upper-middle-income countries were slightly higher still.

The last column in Table 1 gives the annual percentage changes in support ratios between 2005 and 2010. Support ratios were improving in every lower- and upper-middle-income country, but they were going down in all but three high-income countries. This trend is expected to continue as elderly populations in rich countries expand.

### Diversity among lower-income countries

Support ratios in lower-income countries vary much more widely than in upper-middle- and high-income countries. The diversity in the support ratio for six lower-income NTA member countries, starting from 1950 and projected to 2050, is striking (Figure 4).

All of these countries are expected to go through the three phases of the demographic transition, although the final stage of aging, marked by a decline in the support ratio, does not occur in the African countries or the Philippines until after 2050. In Vietnam the swings in the support ratio are sharp, and the age transition is very compressed. During its dividend phase, Vietnam's support ratio moves from the lowest to the highest value in 44 years, while in the Philippines the same process takes 79 years. This is because fertility in the Philippines is still relatively high and is declining very slowly.

The total increase in the support ratio from lowest to highest value also varies greatly from country to country. The total gain is relatively small for India and Nigeria, at 21 percent and 19 percent, respectively. For the other countries, the total gain ranges from 35 percent in Indonesia to 43 percent in Vietnam.

Kenya and Nigeria had the lowest support ratios in 2010, as shown in Table 1. This is unlikely to change in the foreseeable future. Kenya's support ratio began to improve in 1981, but from a very low starting point. By 2050, Kenya will have somewhat fewer young consumers and very few elderly consumers, but it will still have less than one effective worker for every two effective consumers.

In Nigeria, the support ratio has always been higher than in Kenya, but because of continued high fertility, Nigeria's support ratio did not begin to improve until 2004. In 2050, Nigeria will also have less than one effective worker for every two effective consumers.

Why has the support ratio in Kenya been so much lower than in any other country? The main reason has been Kenya's extraordinarily large child population, related to very high fertility (United Nations 2012). The total fertility rate in Kenya peaked between 1960 and 1970 at 8.1 children per woman. In Nigeria, total fertility peaked 15 years later, between 1975 and 1985, at 6.8 children per woman.

Perhaps surprisingly, by 2050 the support ratio in Vietnam will be similar to that of Kenya and Nigeria (Figure 4). Vietnam's large number of effective consumers will consist mostly of the elderly, while Kenya and Nigeria will still be supporting substantial numbers of children. Vietnam will enter this phase after 35 years of favorable demographic conditions, however, starting in the early 1970s. If the Vietnamese can take advantage of their first demographic dividend to achieve a second dividend through higher rates of saving and investment, they may achieve continued economic growth in spite of population aging.

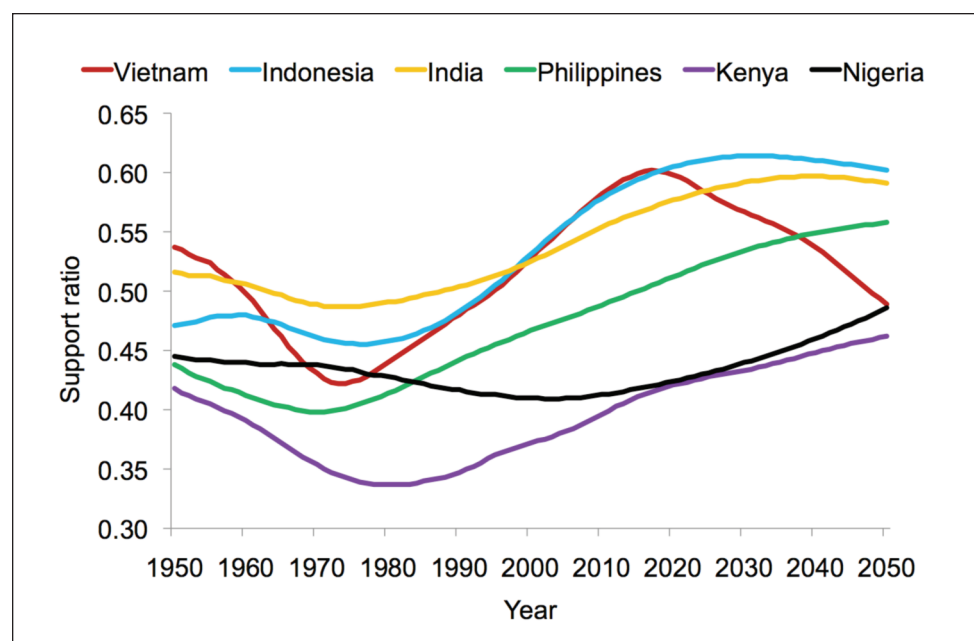


Figure 4. Trends in the support ratio for six lower-income countries, 1950–2050.

Source: Calculated from NTA data; population estimates and projections from United Nations 2012.

## Some observations for policymakers

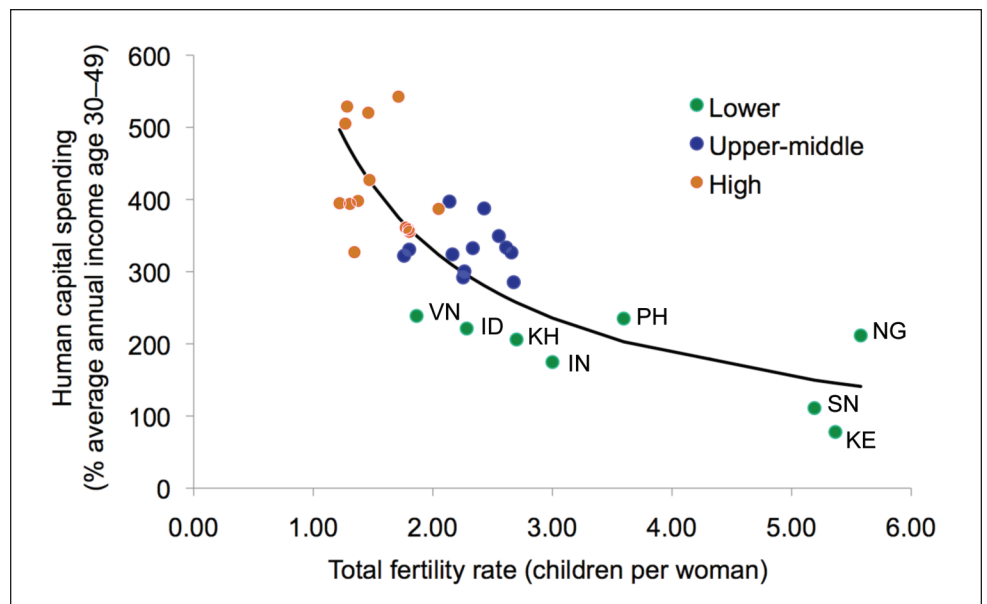
Lower-income countries with large child populations will not achieve a demographic dividend until birth rates decline and age structures shift away from a pattern that is dominated by large numbers of children. Investment in the health and education of each child is also important to boost the productivity of future workers.

In addition to high fertility, many lower-income countries face high unemployment or underemployment among young adults. Policies and programs that improve labor participation rates and labor income are critical, particularly for young workers who comprise large segments of these populations. And finally, it is not too soon to think about the economic consequences of population aging.

### Fertility decline is key

The demographic dividend occurs because of fertility decline. If fertility does not decline, the share of populations in the working ages does not increase. Rapid fertility decline produces a sharp rise in the support ratio, which frees up resources that can be used to raise current standards of living and increase pro-development spending. Countries in East Asia were particularly successful in realizing large demographic dividends because their fertility decline was so rapid. Today, this demographic pattern is being repeated in Vietnam, producing a very significant increase in its support ratio.

Slow fertility decline does produce an increase in the support ratio, but it can be extremely gradual, with very modest increases evolving over an extended period of time. Current population projections for many low-income countries anticipate a slow fertility transition and a slow rise in the support ratio. Fertility may decline much more rapidly than anticipated, however, if countries are able to initiate and sustain successful, large-scale programs that encourage lower rates of childbearing on a voluntary basis.



**Figure 5. Tradeoff between human-capital spending and fertility.**

Source: Update of estimates presented in Lee and Mason (2010).

Note: Lifetime human-capital spending per child is a synthetic cohort measure constructed by cumulating per capita health spending from ages 0–17 and per capita education spending from ages 3–26. To enable international comparison, the values are expressed as a percentage of the average annual labor income of adults age 30–49 in each country. See Table 1 for country designations.

### Emphasis on child health and education

Low fertility and a rising support ratio free up resources that can be invested in the health and education of children. As these children grow older and enter the labor force, this will have a favorable impact on the economy. Not only will the relative number of workers increase, but healthy, well-educated workers will be more productive. In this way, countries can realize a larger and longer-lasting demographic dividend by spending more on children's education and health as fertility declines.

Investing more in children also has an important long-term advantage. Eventually lower-income countries will experience a decline in their support ratios because lower fertility eventually means fewer workers. If countries invest enough in human capital, however, they will be replacing large cohorts of less productive workers with smaller cohorts of more productive workers. By doing so, the demographic dividend can be sustained even as the support ratio begins to decline.

NTA data show that, in fact, most countries are taking advantage of fertility decline to increase spending on the health

and education of children (Lee and Mason 2010). Estimates from 32 countries confirm the link between low fertility and high investment in children's health and education (Figure 5).

Low-income countries, however, tend to spend relatively little on the health and education of their children, even when measured in terms of their own labor income. In Figure 5, six of the eight NTA member countries with lower incomes are well below the trend line, indicating that they spend less on child health and education than would be expected for their level of fertility.

What factors drive these disparities in spending on health and education? For one thing, poor countries—by definition—have limited resources. Poor families and governments, who are struggling to meet the basic needs of growing populations, may simply not have the resources to pay very much for the education and healthcare of children. External resources, such as international development assistance, are insufficient to fill the gap.

Another factor is the balance between public and private spending. Public programs tend to play a more modest role

in supporting children in lower-income countries, leaving young people dependent on support from their families. This means that children from poor families are particularly disadvantaged, with severely limited potential for economic mobility (Turra et al. 2011).

### Better earning opportunities for young adults

In every country in the world, the transition from school into the labor force has important implications for human wellbeing and economic growth. For lower-income countries with large populations of adolescents and young adults, programs that promote a smooth transition into productive employment have particular priority. Although young people in poor countries may wish to enter the labor force at an early age, their unemployment levels may be high and their average earnings are often low.

Analysis of how variation in the economic lifecycle influences the support ratio shows the critical importance of the age pattern of labor income. The greatest demographic dividend will be achieved in countries that can improve employment

opportunities for young adults. A central component is to increase opportunities for young women (Bloom et al. 2009).

Data on labor income by one-year age groups show that young people in NTA member countries in Africa earn far less, compared with the labor income of prime-age adults, than their counterparts in Asia or Latin America (Figure 6). Because African countries have such young populations, low labor income for this age group has a particularly strong impact on the support ratio, undermining efforts to achieve a robust demographic dividend.

Policies and programs that improve employment opportunities for young people merit high priority. Among NTA member countries, Austria provides one example. The Austrian government offers school leavers a dual education and training program that combines work in the private sector with government-sponsored vocational school (Austria, Federal Ministry of Economy, Family, and Youth, n.d.). The companies pay the young people's salaries while they are working, and the government pays their salaries and part of their health insurance while they are in vocational training.

About 40 percent of all young Austrians participate in the program. And indeed, NTA data show that young adults in Austria start generating labour income at much earlier ages than in other European countries. Policymakers in low-income countries may look to such examples as they plan ways to help young people make a smooth transition into the workplace.

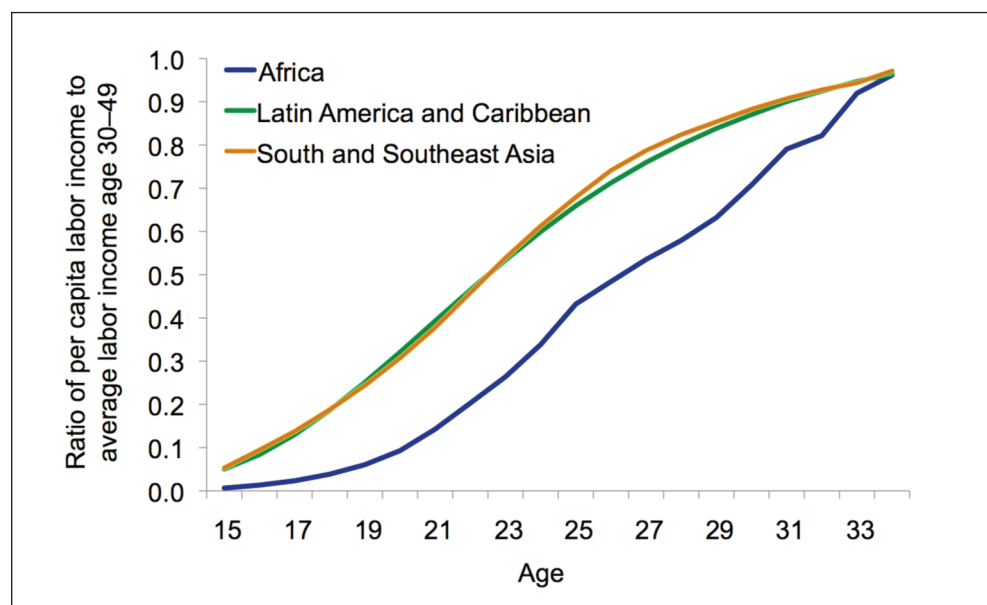
### Not too soon to think about population aging

Economic security for the elderly is an issue in every country. Today, the elderly in lower-income countries are likely to work well into old age, but their labor income tends to be low. NTA estimates show that these elderly populations are supporting one-third or less of their consumption through their labor. To fill the gap between what they need and what they earn, they rely on their families and the assets they accumulated earlier in life. Government programs play a very small role.

Policymakers need to think ahead about how their growing elderly populations will be supported in the future without overburdening those at working age or sacrificing economic growth. As countries become richer, many consider establishing public pension (social security) programs and expanding public healthcare services for the elderly.

Indeed, the public sector has an important role to play in providing for the basic economic security of older populations. But overly generous programs designed for small numbers of elderly will become unsustainable in the future as the relative size of elderly populations expands. The goal should be to establish public programs that provide some basic level of security but that can be sustained in the years ahead. Public policy should also encourage, or at least not undermine, asset accumulation by workers to help fund their own retirement.

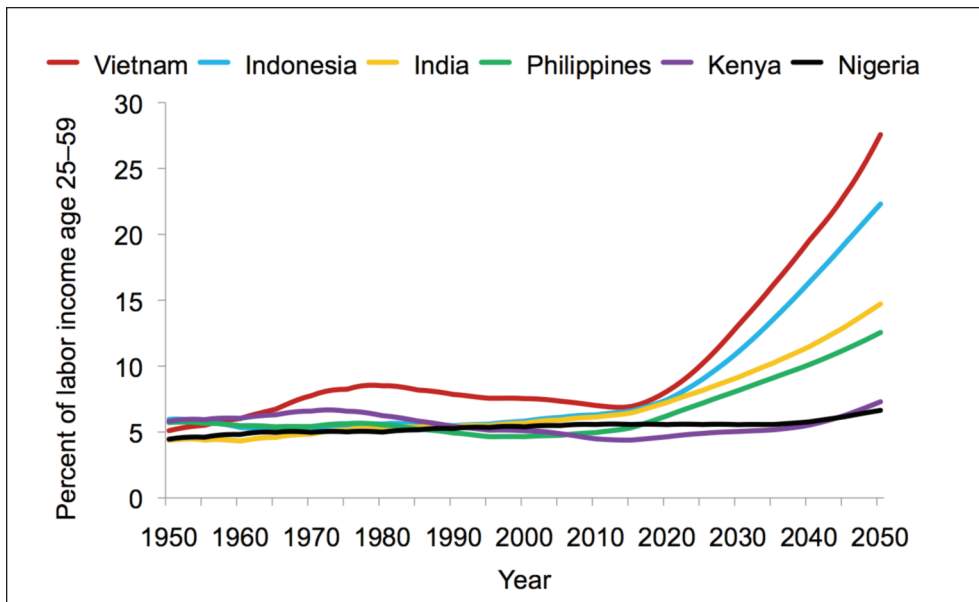
The importance of looking ahead can be seen by using United Nations population projections combined with NTA consumption and income data to project the financial needs of the elderly.



**Figure 6. Per capita labor income at age 15–34 in NTA member countries in Africa, Latin America and the Caribbean, and South and Southeast Asia.**

Source: Calculated from NTA data.

Note: Values are expressed as ratios to average per capita labor income at age 30–49. Values for Africa are averages for Kenya, Nigeria, and South Africa. Values for Latin America and the Caribbean are averages for Argentina, Brazil, Chile, Colombia, Costa Rica, Jamaica, Mexico, Peru, and Uruguay. Values for South and Southeast Asia are averages for India, Indonesia, the Philippines, Thailand, and Vietnam. Estimates are for a recent year that varies among countries.



**Figure 7. Lifecycle deficit (gap between consumption and labor income) of those 60 and older as a percentage of labor income at age 25–59, six lower-income countries, 1950–2050.**

Source: Consumption and labor income from NTA data; population estimates and projections from United Nations 2012.

Note: Population estimates and projections are for individual countries. Consumption and labor income values are based on the average profiles for all the middle- and lower-income countries combined.

Figure 7 shows the lifecycle deficit for the elderly—defined as the gap between consumption and labor income—as a percentage of the total labor income of adults age 25–59.

Today, governments in lower-income countries could fully fund the financial needs of their elderly populations at a relatively low cost (although the elderly might work less if such support became available). A tax on all workers of about 5 percent of labor income would be required to accomplish this. By comparison, the earnings tax in the United States for pension and healthcare programs is almost 15 percent.

As populations in lower-income countries begin to age, any program that supported all the financial needs of the elderly would surely collapse. In Vietnam, taxes would have to reach well above 25 percent of labor income by 2050 to sustain such a program. The lower-income countries in Africa are aging much more slowly, but eventually their elderly populations will also start to expand, and they too will face problems of sustainability if they initiate very generous programs today. Programs for the elderly are important, but they must also be realistic.

At the same time, governments have other roles to play in promoting the well-being of their elderly populations. One of the most important ways to ensure that countries can cope with a larger number of dependents in the future is to encourage productive investment today—investment that contributes to higher productivity and economic growth. If people can find productive and remunerative employment today, they are also better able to set money aside for future consumption.

Priorities for policymakers include enacting labor laws that discourage discrimination against older workers and extend or eliminate mandatory retirement ages. In addition, governments can play an important role by creating an economic environment that helps working-age populations accumulate wealth and establish some degree of financial independence. Well-functioning financial markets, a strong banking system, secure property rights, a competitive economy, and financial literacy all play a role in assuring the economic security of all age groups, including the elderly.

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