

Table 2. Population sizes (in millions) in world, regions, and selected countries in 2000 and 2050 according to four scenarios. Source for base year is (39) and for scenarios is (18).

	2000	2050			
	(Base year)	FT	GET	CER	CEN
World	6115	8885	8954	9728	9977
Africa	819	1871	1998	2236	2393
Asia	3698	5102	5046	5487	5560
Latin America and Caribbean	521	718	729	809	835
Ethiopia	66	153	174	203	214
India	1043	1580	1614	1732	1789
Kenya	31	84	85	100	114
Nigeria	125	275	289	319	340
Pakistan	148	328	335	353	360
Uganda	24	89	91	105	116

the prevalence of disability in the future. If the focus is only on age and sex, then the observed pattern of increased disability at higher ages, together with the projection that there will be more elderly in the future, results in quite dramatic forecasts of future numbers of persons with severe disabilities. If education is also factored in, the picture looks less dramatic. In most countries, the elderly of the future will be better educated than the elderly of today. Assuming that the better educated at any age have substantially lower disability rates, this improving education factor may partly or even fully compensate for the aging factor (1, 29). But because there are still many unknowns, these interactions between education and health are an important field for more research.

Education matters greatly for many further issues than disability, longevity, and economic well-being. At the individual level, better educated people are doing better along almost any dimension, ranging from mental health to the ability to recover from shocks to lower unemployment. At the aggregate level, systems of governance and democracy have been shown to be closely related to a society's level of education (38). It has been shown that the age structure of human capital and, in particular, the time when large cohorts of better educated men and women enter the young adult ages play a key role in the transitions of societies into modern democracies (31). Large cohorts of young adults (sometimes called the "youth bulge") who are also better educated but cannot match their higher aspirations with the realities under an oppressive regime present a major force toward change. This picture fits well to the recent events in the Arab world (31).

Because most populations of the world have seen increases in school enrollment rates among the younger cohorts over the past years, the young are generally better educated than the old. This fact implies that much improvement in the average education of the future adult population is already assured as these better educated cohorts move up the age pyramid. This can be seen in Fig. 2, in which—depending on

the scenario—much of the expected population increase will be for people with secondary and tertiary education. In view of the many positive implications of secondary and tertiary education, this is good news, but the full effects will only come to fruition in the developing world if strong further investments in education are being made.

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PERSPECTIVE

Cities, Productivity, and Quality of Life

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Technological changes and improved electronic communications seem, paradoxically, to be making cities more, rather than less, important. There is a strong correlation between urbanization and economic development across countries, and within-country evidence suggests that productivity rises in dense agglomerations. But urban economic advantages are often offset by the perennial urban curses of crime, congestion and contagious disease. The past history of the developed world suggests that these problems require more capable governments that use a combination of economic and engineering solutions. Though the scope of urban challenges can make remaining rural seem attractive, agrarian poverty has typically also been quite costly.

The tight correlation between urbanization and economic development throughout the world reflects a global transition from

poverty to prosperity. However, urban density also brings enormous challenges, including crime, congestion, and contagious disease, and these

challenges are being poorly met by many of the governments of the developing world. Some look at the problems of the developing world's megacities and think that things would be better if their residents just remained in rural areas, but there is little upside in rural poverty. To ensure that the world's cities are going to be places of pleasure, as well as places of productivity, they need governments that can do a better job of providing the basics of city living: clean water, safe neighborhoods, and fluid streets.

The United Nations declared that one-half of humanity was living in cities in 2008 and that the world's urban population would increase by another 50%, to 5 billion, by 2030 (1). The tight correlation between urbanization and economic development led me to depict this trend optimistically in my recent book, *Triumph of the City* (2): that the growth of cities reflects a global transition from poverty to prosperity. But urban density also brings enormous challenges, including crime, congestion, and contagious disease, and these challenges are being poorly met by many of the world's weaker governments.

Using 2008 data on 181 countries, I calculated a correlation of 0.7 between the logarithm of per capita gross domestic product (GDP) and urbanization. A 10% increase in urbanization (3) is associated with a 61% increase in per capita GDP (4). Still, there are reasons to be cautious about this connection. Some authors have questioned the causality of this link and shown that initial urbanization levels are neither positively nor negatively associated with subsequent income growth (5).

Countries urbanize for many reasons, not all of them beneficial. Strife in the hinterland and dictatorships that concentrate public spending in the capital city can create bloated megacities. Moreover, cross-national data linking urbanization and wealth can never provide the rigor of a controlled experiment. Urban economists have understandably put far more weight on the within-country connection between urban density and income in making casual arguments.

Within nations, there is also a strong correlation between working in a large urban agglomeration and income, but this correlation is potentially compromised because big cities may form in areas that are inherently more productive and they attract individuals who are inherently more skilled. Research has countered the first concern by looking at geographic variables, such as bedrock, that make density easier to accommodate but are not thought to have an independent impact on modern productivity (6). Researchers have addressed the second problem by controlling

extensively for individual attributes, including standardized tests, and by examining the wage gains experienced both coming to and leaving urban areas (7). One recent study using French data finds that individuals experience large income gains relative to their lifetime earnings average when they live in an urban location or in an area where soil makes urbanization more likely (8).

These findings generally corroborate the existence of agglomeration economies, which refer to increases in productivity associated with urban proximity. Though there were certainly many cities before the industrial revolution, large-scale urbanization has typically accompanied industrialization, perhaps because these economies are more important in nonagricultural pursuits. These economies are thought to exist because proximity lowers the costs of shipping goods, such as intermediate inputs for manufacturers, or delivering face-to-face services. The importance of this force is corroborated by the fact that industries locate near their suppliers and customers (9). Proximity also improves the efficiency of labor markets by providing workers with a plethora of employment options. These agglomeration benefits seem particularly relevant for services, which may explain why services (and especially business services), not manufacturing, dominate American cities today.

The fact that wage growth is faster for urban workers supports the hypothesis that cities speed the flow of knowledge and new ideas that was advanced by the 19th-century economist Alfred

Marshall. The tendency of patents to cite previous patents that were taken out by nearby innovators also supports the view that geographic proximity can facilitate knowledge flows (10).

The productivity advantages associated with urban location do not imply that more individuals should move to cities or that countries should heedlessly encourage urbanization. Whereas nominal incomes are substantially higher in America's urban areas, incomes correcting for the local cost of living are not, which implies that people are not better off financially in real terms in cities (11). Though urban living can bring nonpecuniary benefits, such as access to great restaurants and museums, it can also bring nonpecuniary costs, such as long commute times and crime.

In a sense, these costs are the negative side of agglomeration economies—the price paid for being close to other humans. If two people are close enough to exchange an idea face to face, they are also close enough to give each other a disease. If they are close enough to exchange a newspaper, they are also close enough to rob one another.

The downsides of density are particularly obvious in the megacities of the developing world. Clean water is a major problem in the poorer cities of Asia and Africa. Crime is a great curse in Latin American metropolises. Throughout the world, traffic congestion reduces the core benefit of cities: the ability to connect with other people easily.

It seems clear that the cities of the developing world face enormous challenges in public health,

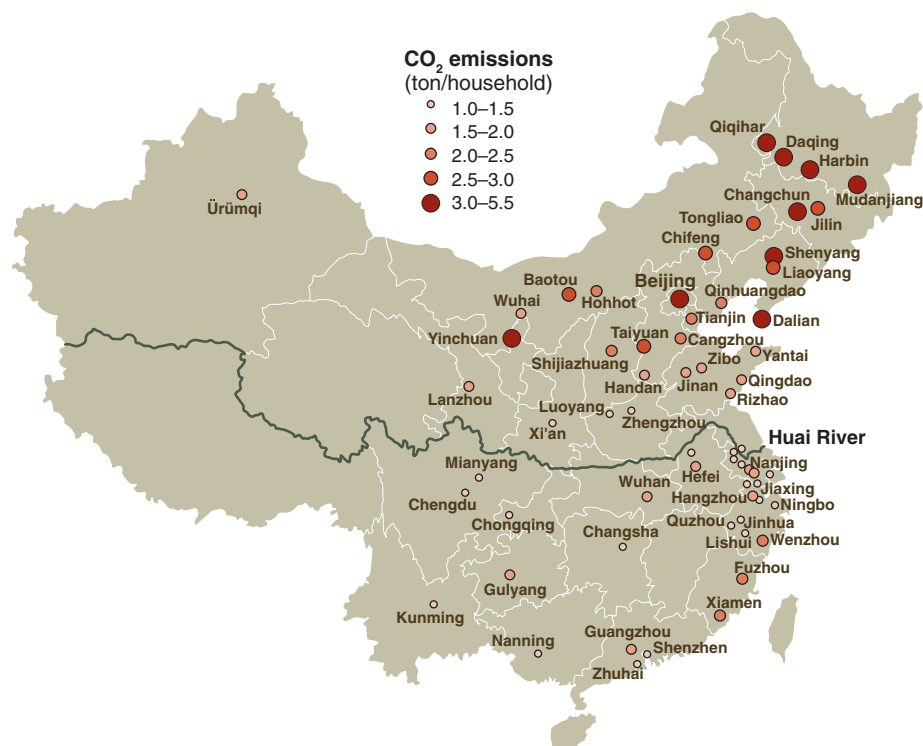


Fig. 1. Carbon dioxide emissions per household in 74 Chinese cities, 2006 (19).

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safety, and transportation that will need to be met for these cities to become more livable. But history offers some hope. The cities of the West were also once places of death and disease, and they now are quite healthy. Life expectancy for a boy born in New York City was 7 years less than the national average in 1901 (12, 13); now, it is nearly 2 years longer (14) than the national average (15). Among younger people, mortality rates in New York are lower because of lower numbers of motor vehicle accidents and fewer suicides; the lower levels of mortality from pulmonary disease among the elderly may be associated with more exercise or social connection.

New York and other American cities did not become safe by accident. America's cities devoted enormous amounts of resources to public health investments such as waterworks. At the start of the 20th century, America's city governments were spending as much on clean water as the federal government was spending on everything except the postal service and the army (16). The cities of the developing world will surely have to make similar investments to reduce their own mortality levels.

Although the problem of clean water was solved with an engineering solution, it has become clear that we cannot just build our way out of traffic congestion. Using U.S. data, Duranton and Turner established that vehicle miles traveled increase roughly one-for-one with highway miles built, which they refer to as the fundamental law of traffic congestion (17). Fighting for faster commutes seems to require economics as well as engineering, and economics teaches us that if a scarce commodity such as access to roads, is given away for free, people will overuse that resource. The natural solution, which has been adopted successfully in cities like Singapore and London, is to charge drivers a congestion fee for the right to drive on high-demand streets.

One way to understand the urban challenge is that people in cities need good government much more than people living in low-density areas. The negative effects of closeness, including contagious disease and congestion, require competent governments to manage human waste and traffic. Many poorer countries are poor precisely because their governments are inadequate; as a result, their cities also function poorly.

Considering the problems of the developing world's megacities, some people believe that conditions would improve if residents remained in rural areas, but there is little upside to rural poverty. The within-country connection between income and urban location is even stronger in developing countries than it is in the U.S. Across countries, urbanization is not only linked with higher incomes, it is also associated with higher levels of reported life satisfaction (2).

Moreover, cities have often been associated with the political change that dysfunctional governments badly need. Revolutions and political

movements need coordination, and urban proximity can facilitate that coordination. America itself owes much to the Boston uprisings triggered by the urban partnership of Sam Adams and John Hancock.

Environmentalists in the tradition of Thoreau often see cities as the enemy, but that perspective is somewhat flawed. Living around nature can be quite harmful to the environment, as Thoreau's own life well illustrates. One consequence of his sylvan life-style was an enormous forest fire he started accidentally in 1844 that destroyed hundreds of acres of woodlands.

Within the United States, low-density living is associated with substantially higher carbon emissions from home energy use and transportation than is living in dense urban centers. Matthew Kahn and I have estimated carbon emissions across a wide range of American metropolitan areas, holding income and family size constant (18). We find that emissions are almost always lower in central cities than in suburbs, primarily because of decreased gasoline consumption and home electricity use. Across metropolitan areas, per-household emissions are lower in larger and more compact metropolitan areas.

True rural poverty involves relatively low levels of energy use, but the developing world is unlikely to remain poor. As they grow richer, countries like India and China will have to choose between car-oriented low-density living and higher-density city living built around public transportation and elevators. The latter option involves far lower carbon emissions and less risk to the environment. Figure 1 (19) illustrates the carbon emissions for different Chinese cities today from the household and transportation sector; these emissions are typically less than one-tenth of U.S. levels, but that will change rapidly as China's economy expands, if the Chinese follow an American pattern of low-density sprawl.

Looking forward, the cities of the developing world can realize their transformative potential, but several challenges will need to be met. In the case of water and sewage, the primary problem is resources. We know how to deliver good water, but many cities simply do not have the resources to make these investments. In the case of crime, the solution is less clear. Incarceration does reduce crime, but it does so at a considerable human cost, and many solutions are context-dependent. For example, closer ties between police and the community can produce good policing in well-governed societies and complete corruption in places with weaker polities. Implementing congestion pricing is always unpopular, and it requires political well-being that is absent almost everywhere, including the United States.

The great environmental challenge is moving to an urban world that involves less car travel and home energy use. China seems to be embracing a high-rise future, perhaps because its leaders wish

to avoid being dependent on foreign oil. India, however, has embraced height controls that push people out rather than up. Moreover, the messy democracy of India seems unlikely to undertake difficult policies to advance an environmental agenda. As the growth in global carbon emissions depends far more on India and China and the rest of the developing world than on anything done in the U.S. and Europe, their choices about urban form will have a large impact on greenhouse gas emissions worldwide.

Cities have costs as well as benefits, and governments should not force people to urbanize; yet, they also should not stop rapid city growth that reflects urban economic advantages. If the world's cities are going to be centers of productivity and pleasure, governments all over the world need to improve at providing clean water, safe neighborhoods, and fluid streets—the basics of city living.

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