". . . And what is it," I said softly, more to myself than to John, "what is it that people do? What do we live to do, the way a horse lives to run?"

[Beck, 2011, pp. 134–136, 138]

The second AFP test was in the normal range, "meaning that there was no reason to fear . . . Down syndrome" (p. 142). John and Martha no longer discussed abortion.

The opposite of a false positive is a *false negative*, a mistaken assurance that all is well. Amniocentesis revealed that the second AFP was a false negative. Their fetus had Down syndrome after all. John and Martha had another angry discussion, and Martha decided to give birth to Adam, who has Down syndrome. Years later they had a third child. When Adam was in early adolescence, Martha and John divorced.

Low Birthweight

low birthweight (LBW)
A body weight at birth of less than 5½ pounds (2,500 grams).

very low birthweight (VLBW)
A body weight at birth of less than 3 pounds, 5 ounces (1,500 grams).

extremely low birthweight (ELBW)
A body weight at birth of less than 2 pounds, 3 ounces (1,000 grams).

preterm birth
A birth that occurs three or more weeks before the full 38 weeks of the pregnancy—that is, at 35 or fewer weeks after conception.

small for gestational age (SGA)
Having a body weight at birth that is significantly lower than expected, given the time since conception. For example, a 5-pound (2,265-gram) newborn is considered SGA if born on time but not SGA if born two months early. (Also called *small-for-dates*.)

As you just read, small and immature newborns are more vulnerable to every teratogen and birth complication. The international cutoff for **low birthweight (LBW)** is 2,500 grams (5½ pounds). UNICEF estimated that 22 million low-birthweight babies were born in 2013.

Some LBW babies are **very low birthweight (VLBW),** under 1,500 grams (3 pounds, 5 ounces), and **extremely low birthweight (ELBW),** under 1,000 grams (2 pounds, 3 ounces). It is possible for a newborn to weigh as little as 500 grams. They are the most vulnerable: Half of them die even with excellent care, and none of them live without it (Lau et al., 2013).

Remember that fetal weight normally doubles in the last trimester of pregnancy, with most of that gain occurring in the final three weeks. Thus, a baby born **preterm** (three or more weeks early, no longer called *premature*) is usually, but not always, LBW.

In addition, some fetuses gain weight slowly throughout pregnancy and are *small-for-dates,* or **small for gestational age (SGA).** A full-term baby weighing only 2,600 grams and a 30-week-old fetus weighing only 1,000 grams are both SGA, even though the first is not technically LBW.

CAUSES OF LOW BIRTHWEIGHT Maternal or fetal illness might cause SGA or preterm birth, but maternal drug use is a more common cause. Every psychoactive drug slows fetal growth, with tobacco implicated in 25 percent of all LBW newborns worldwide.

Another common reason for slow growth and preterm birth is malnutrition. Women who begin pregnancy underweight, who eat poorly during pregnancy, or who gain less than 3 pounds (1.3 kilograms) per month in the last six months more often have underweight infants.

Unfortunately, many risk factors—underweight, undereating, underage, and smoking—tend to occur together. To make it worse, many such mothers live in poor neighborhoods, where pollution is high—another risk factor for low birthweight (Stieb et al., 2012).

The causes of low birthweight just mentioned rightly focus on the pregnant woman. However, fathers—and grandmothers, neighbors, and communities—are often crucial. Everyone who affects a pregnant woman also affects the fetus. She may be stressed because of her boss, her mother, her mother-in-law, and especially her partner. Because of the social system, it is not surprising that unintended pregnancies increase the incidence of low birthweight (Shah et al., 2011).

The role of the social network is most apparent in what is called the **immigrant paradox**. Many immigrants have difficulty getting education and well-paid jobs; their socioeconomic status is low. Low SES correlates with low birthweight.

immigrant paradox
The surprising fact that immigrants tend to be healthier than U.S.-born residents of the same ethnicity. This was first evident among Mexican Americans.

Thus, immigrants should birth more LBW babies. But, paradoxically, their babies are generally healthier in every way, including in weight, than newborns of native-born women of the same gene pool (García Coll & Marks, 2012).

This was first called the *Hispanic paradox* because, although U.S. residents born in Mexico or South America average lower SES than people of Hispanic descent born

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Watch **Video: Low Birthweight in India,** which discusses the causes of LBW among babies in India.

in the United States, their newborns have fewer problems. The same paradox has been found for immigrants from the Caribbean, Africa, eastern Europe, and Asia. The crucial factor may be fathers and grandmothers, who keep pregnant immigrant women healthy and drug-free, counteracting the stress of poverty (Luecken et al., 2013).

Newborns of Chinese descent born in the United States are an interesting case. If their mothers' socioeconomic status is low, newborns weigh more and are less likely to die *if* their mothers were born in China, not in the United States. However, if the mother is college-educated, then the babies are healthier if their mothers are U.S.-born (Li & Keith, 2011).

This suggests that maternal education, household income, and social support all protect prenatal health. Of the three, social support may be most crucial, but the other two are important as well.

CONSEQUENCES OF LOW BIRTHWEIGHT You have already read that life itself is uncertain for the smallest newborns. Ranking worse than most developed nations—and just behind Cuba and Croatia—the infant mortality rate (death in the first year) of the United States is 34th in the world, about 6 deaths per 1,000 live births. One major reason is that the United States has more ELBW (under 1,000 grams) births (MacDorman et al., 2014).

For survivors born underweight, every developmental accomplishment—smiling, holding a bottle, walking, talking—is late. Low-birthweight babies experience cognitive difficulties as well as visual and hearing impairments. High-risk newborns become infants and children who cry more, pay attention less, disobey, and experience language delays (Aarnoudse-Moens et al., 2009; Stolt et al., 2014).

Longitudinal research from many nations finds that children who were at the extremes of SGA or preterm have many neurological problems in middle childhood, including smaller brain volume, lower IQs, and behavioral difficulties (Clark et al., 2013; Hutchinson et al., 2013; van Soelen et al., 2010). Even in adulthood, risks persist: Adults who were LBW are more likely to develop diabetes and heart disease.

Longitudinal data provide both hope and caution. Remember that risk analysis gives probabilities, not certainties—averages are not true in every case. By age 4, some ELBW infants are normal in brain and body development. Some adults were very small babies and have become happy and successful.

COMPARING NATIONS In some northern European nations, only 4 percent of newborns weigh under 2,500 grams; in several South Asian nations, including India, Pakistan, and the Philippines, more than 20 percent are that small. Worldwide, far fewer low-birthweight babies are born than two decades ago; as a result, neonatal deaths have been reduced by one-third (Rajaratnam et al., 2010).

Some nations, China and Chile among them, have improved markedly (Hellerstein et al., 2015). In many nations, community health programs emphasize prenatal health. That helps, according to a study provocatively titled *Low birth weight outcomes: Why better in Cuba than Alabama?* (Neggers & Crowe, 2013).

In some nations, notably in sub-Saharan Africa, the LBW rate is rising because global warming, HIV, food shortages, wars, and other problems affect pregnant women. Another nation with a troubling rate of LBW is the United States, where the rate fell throughout most of the twentieth century, reaching a low of 7.0 percent in 1990. But then it rose again, with the 2013 rate at 8.02 percent, ranging from under 6 percent in Alaska to over 12 percent in Mississippi (see Figure 2.8).

There are some encouraging data: The U.S. low-birthweight rate was even higher a few years ago, at 8.2 in 2007, and the rate of LBW newborns has fallen, while the medical care of babies born at less than 28 weeks is among the best in the world (MacDorman et al., 2014).

THINK CRITICALLY: Food scarcity, drug use, and unmarried parenthood have all been suggested as reasons for the LBW rate in the United States. Which is it—or are there other factors?